Largest Sale of Any Aviation Magazine

Chicago Public Library
SCIENCE AND INDUSTRY

POPULAR AVIATION

APRIL 1933
25c

Boeing P12-E
See Page 227

MODEL CONTEST WINNERS

DOUBLE PAGE BLUEPRINT

Pages 246-247

How to Build the CORBEN JUNIOR ACE

XUM

Our NEW and SPECIAL "Get Acquainted" OFFER!

BIG 20c SPRAYER—ONLY 5c

Not more than 1 Sprayer Per Customer!

MODEL BUILDERS OF AMERICA! To show our appreciation in your past patronage and to introduce you NEW customers to our quality line of supplies, we will allow you to purchase ONE 20-CENT SPRAYER FOR 5c—75% SAVING! But you must act immediately as this "Get Acquainted" Offer expires at midnight May 30th, 1933! EVERY MODEL BUILDER NEEDS THIS GREAT SPRAYER! It shrinks paper just right, giving you a good tight job. Glass container shows amount of liquid at all times! PLEASE NOTE: No order for Sprayer at 5c will be accepted **without an additional order for at least $1.00 worth of B.P.A. supplies.** Now order — and SAVE MONEY!

Offer Good Only Until Midnight, May 30th, 1933! So Order NOW!

By Request—We Repeat The True Story of HOW and WHY We Formed This Unusual Company!

One evening a group of **business men**—all model airplane **enthusiasts**—were discussing their hobby. During their conversation, one of the group said: "Why not pool our **business** brains, experience, and model airplane interests together with our adequate capital, in organizing a company whose biggest aim shall be to SERVE THE MODEL BUILDERS OF AMERICA!" He continued: "By this I mean to give builders the best **quality** supplies possible, at the most **reasonable** prices, to give them really **quick, efficient service,** and above all, to absolutely GUARANTEE that all supplies sold shall be satisfactory to the buyer, or an exchange will be made, or the customer's money will be promptly refunded!" The idea was discussed thoroughly—and O. K.'d! The best possible machinery was installed, skilled workmen were hired, a businesslike, efficient system was created . . . the best of merchandise was purchased. NOW we invite you—we URGE you—to **order at once** and enjoy the experience of doing business with a modern business organization! Thousands now enjoy this unique SERVICE! Why not YOU? Try us NOW!

ORDER *Without Risk!*

BUY SUPPLIES ON OUR "SATISFACTION GUARANTEED" PLAN — Save Time, Money!

BALSA STRIPS 24" Lengths

1/16" square, each	.01	12 for 5c
1/16 x 1/8", each	1c	10 for 5c
3/32" square, each	1c	9 for 5c
1/16 x 1/4", each	1c	8 for 8c
1/8" square, each	1c	8 for 8c
3/32 x 3/16", each	1½c	8 for 8c
1/8 x 3/16", each	1½c	8 for 8c
1/8 x 1/4", each	2c	5 for 7c
1/8 x 3/8", each	2c	5 for 7c
1/4 x 1/2", each	3c	5 for 10c
3/8" square, each	4c	5 for 16c
3/8 x 1/2", each	5c	5 for 20c
1/2" square, each	6c	5 for 25c
1 x 1", each	13c	4 for 45c

Other sizes to order.

BALSA STRIPS 36" Lengths

1/8" square, each	1c	6 for 5c
1/8 x 1/4", each	2c	6 for 10c
3/16" square, each	2c	5 for 9c
1/4" square, each	3c	5 for 12c
1/8 x 3/8", each	2c	5 for 9c

SHEET BALSA

	24"	36"		24"	36"
1/32 x 2"	3c		3/32 x 2"	4½c	6½c
1/16 x 2"	4c	5c	1/8 x 2"	4½c	6½c
1/16 x 3"	6c		3/16 x 2"	6c	9c
1/16 x 4"	9c		1/4 x 2"		11c

PROPELLER BLOCKS

3/8 x ½ x 6", each	1c	6 for 4c
1/2 x ¾ x 6", each	1c	6 for 5c
9/16 x ⅞ x 7", each	2c	6 for 10c
3/4 x 1⅛ x 8", each	3c	3 for 8c
7/8 x 1¼ x 8", each	4c	3 for 10c
3/4 x 1½ x 8", each	5c	3 for 13c
3/4 x 1¼ x 10", each	6c	3 for 15c
1 x 1½ x 8" each	7c	3 for 18c
1 x 1¼ x 10" each	8c	3 for 21c
1 x 1½ x 10" each	9c	3 for 24c
1 x 1½ x 12", each	10c	3 for 27c
1¼ x 1⅝ x 12", each	13c	3 for 35c
2 x 2 x 12", each	17c	3 for 48c

PLANK BALSA

1 x 3 x 36"	33c	2 x 6 x 36"	80c
2 x 3 x 36"	55c	2 x 6 x 40"	95c

CELLULOID SHEETS

4 x 6" 3c

WASHERS

Per doz. 3c

PROPELLER SHAFTS

Each 1c

DOWEL RODS

1/16" dia.,	24" long	8 for 5c
1/8" dia.,	30" long	7 for 5c

THRUST BEARINGS

Small size....2c each; per dozen....18c

SHEET ALUMINUM

.006" thick, per sq. ft. 12c
.010" thick, per sq. ft. 18c

JAPANESE TISSUE

White, 19 x 26" ..... 4c per sheet
36c per doz.

Red, yellow, green, blue, black, orange, and khaki colored Jap tissue, 20½ x 24" 5c per sheet. 48c per doz.

BEST GRADE RUBBER

No. 20 sq. (.045") ..... 3 ft. for 1c
1/32 x 1/16" ..... 3 ft. for 1c
1/32 x 1/8" ..... 3 ft. for 1c

BAMBOO

1/16 x 1/4 x 12" ..... 1c ea., 6c per doz.
1/16 x 1/4 x 15" ..... 1c ea., 8c per doz.
1/16 sq. x 12" ..... 4 for 1c, 36 for 8c

DRI-QWIK CEMENT

Large size tube..10c Pint 85c

BANANA LIQUID

1 oz. bottle..... 7c 2 oz. bottle....10c
Pint 60c

ACETONE

2 oz. bottle.....10c Pint.....75c

ALUMINUM TUBING

1/16" dia., per ft.	8c
3/32" dia., per ft.	8c
1/8" dia., per ft.	10c
3/16" dia., per ft.	11c
5/16" dia., per ft.	13c

CELLULOID WHEELS

¾" dia., per pair 6c
1" dia., per pair 7c
Above two sizes in black, white, blue, red
1-3/16" dia.—(Black only) per pair.. 8c
1⅜" dia., per pair 10c
1⅞" dia., per pair 16c
Above two sizes in blue, white, black, green, yellow.
3" dia. Jumbo wheels (Black only), per pair 30c

CELLULOID DUMMY MOTORS—9 cyl.

1½" dia. 18c
2" dia. 22c

STREAMLINED WHEEL PANTS

Large size to fit 1⅜" and 1⅞" dia. wheels, pair 23c
Small size to fit ¾" and 1" wheels, pair 15c

N.A.C.A. Cowling, 2" dia., each 14c

MUSIC WIRE

Straightened and cut to lengths. 2c per length .014", .016", .018", .020", .022", .024", .029", .033".

SEND NO MONEY—Just the Blank!

Just send convenient Order Blank below, check "C.O.D." space pay postman on delivery! Easy, simple. REMITTANCE RULES: (1) No order under 50c accepted. On supply orders up to $1.50 add 15c packing, postage. Add 10% on orders over $1.50. West of Mississippi, add 10c extra to above charges. (2) We pay postage, insurance on orders of $1 or more, except on balsa planks. (3) Canadians add 25c on orders over $1.50. No Canadian postage, coin accepted. Use International Money Order! (4) Order C.O.D., or (5) Remit cash by postal or express money order. Add 15c extra if check is sent. (6) Print order clearly. (7) Satisfaction guaranteed, or exchange made, or money refunded.

BALSA PRODUCTS CO. OF AMERICA

TO: Balsa Products Co. 1319 So. 5th Av. Div. P.A.—34, Maywood, Ill., U.S.A.

ORDER BLANK

If you haven't our swell catalog, send 3c stamp!

I enclose 3c stamp for Catalog ☐

C.O.D. ☐ I enclose no money. Send C.O.D., articles listed here. I'll pay postman for articles, packing charge, postage, C.O.D. fee.

CASH ☐ I enclose $..... Please send articles ordered below.

PRINT NAME.....

Street..... City..... State.....

Quantity	Size and Description of Article	Price Each	Amount

(Copyrighted 1933 by B.P.A. Co.)

CATALOG Do not buy ANY Supplies till you send 3c stamp for our great Catalog. We send Catalog FREE with order. 3c Stp

Write rest of order on page margin, if not enuf room here!

Dependable Businesslike Service for Businesslike Model Builders!

DEALERS!

Write on letterhead today for Special Discounts. BIG PROFIT handling B.P.A. supplies. REAL SERVICE! Deal with BUSINESS MEN!

BALSA PRODUCTS CO. OF AMERICA

1319 South 5th Avenue, Div. PA-34, Maywood, Illinois, U. S. A.

Don't Spend Another Penny

you read every single one of these Deep Cut Prices on the

AAA SELECT BALSA WOOD

NOTE: AAA grade was the designation of super-quality balsa wood orginated by C. M. & S. Company and now used by many for inferior and soft grades. Beware of substitutes. Cut balsa wood usually obtainable is cut at random, that is, without any selection, from plank balsa on hand. In the factory of the Cleveland Model & Supply Company where large quantities are used, being cut into millions of pieces annually, the wood is sorted by texture for the size to be cut. Careful inspection for defects is given all pieces.

SHEET BALSA

1/32x2x18" 02	3/16 x 2 x 18".....05
1/16x2x18" 03	1/4 x 2 x 18".....06
1/8 x2x18" 04	

STRIP BALSA

1/16x1/16x18" ..4 for .01	1/8x1/2x18" 02
1/16x1/8x18" ..3 for .01	3/16x3/16x18" 01
1/16x3/16x18" ..2 for .01	3/16x1/4x18" 02
1/16x1/4x18" ..2 for .01	1/4x1/4x18" 02
1/16x5/16x18" .2 for .01	1/4x5/16x18" 02
1/8x1/8x18" ...2 for .01	1/4x1/2x18" 03
1/8x3/16x18" 01	3/8x3/8x18" 03
1/8x1/4x18" 01	3/8x1/2x18" 04
1/8x5/16x18" 01	1/2x1/2x18" 05
1/8x3/8x18" 02	

BULK BALSA

1/2x3x18" 18	1x6x36" 80
1x3x18" 20	2x6x36" 75
2x3x18" 25	

FIBRE—For propeller blades, etc.

Red fibre, .025 x 3 x 9.....08

CELLULOID

This is the thinnest celluloid made, only .005 thick, and shouldn't be confused with impractical cellophane for windshields and windows on models.

Clear celluloid 2 x 6.....03

Same High Quality . . .

Nothing Changed except the Price!

Now Every Model Builder can afford the Genuine Cleveland Diamond Parts and Supplies. Send for the No. 11 Complete List—free to everyone!

BEST QUALITY PAPER CEMENT FOR MODELS

1 ounce size 12c; 2 ounce size 20c

CLEVELAND COLORLESS WATERPROOF CEMENT

1 oz., 12c; 2 oz., 20c.

HEY GANG! CLIMB IN HERE AND CHECK TO THE BOWL AND WATCH CHUCK'S NEW OLD CAR DISAPPEAR!
I GOTTA GET BACK TO THE FACTORY AND SELECTING

WHEELS

Wheels are all turned of hard wood and are uncolored. They may be colored easily to match the model they are to be used on. Used exclusively on Cleveland models when supplied. All accurately drilled.

Wheels .....1-1/4" dia.	.04
Wheels .....1-1/2" dia.	.05
Wheels .....1-3/4" dia.	.06
Balloon Wheels 1-1/4" dia.	.05

TISSUE

No 1 tissue is a fairly heavy texture. No. 2 and No. 3 tissues are much finer than No. 1. No. 2 is most commonly employed.

No 1 tissue (cream) 24x36"	.10
No. 2 tissue (very light cream) 21x31"	.04
No. 3 tissue (white) 20-1/2x24-1/2"	.03

NEW CLEVELAND ENAMEL-DOPES

Developed after three years' experimenting involving considerable work by our experimental department and is not obtainable elsewhere as it is made specially for us to our secret formula. To distinguish it from ordinary dopes we added the prefix "enamel." Comes in the following colors in well-made one-ounce and two-ounce screw cap bottles which help prevent rapid evaporation, unlike corked bottles: Diana Cream, Military Yellow, International Orange, Grass Green, Fire Chief Red, Army Olive Drab, Navy Blue, Havana Brown, Glistening White, Glossy Black, Silver, Gold, Clear. 1 oz., 12c; 2 oz., 20c.

MUSIC WIRE

Our music wire is for mechanical purposes manufactured in this country and is the finest obtainable. Each piece is tinned to prevent rusting and comes in straight one-foot lengths. This wire should not be confused with the brittle and so-called straight pieces of imported music (or piano) wire. No. 12 used mostly.

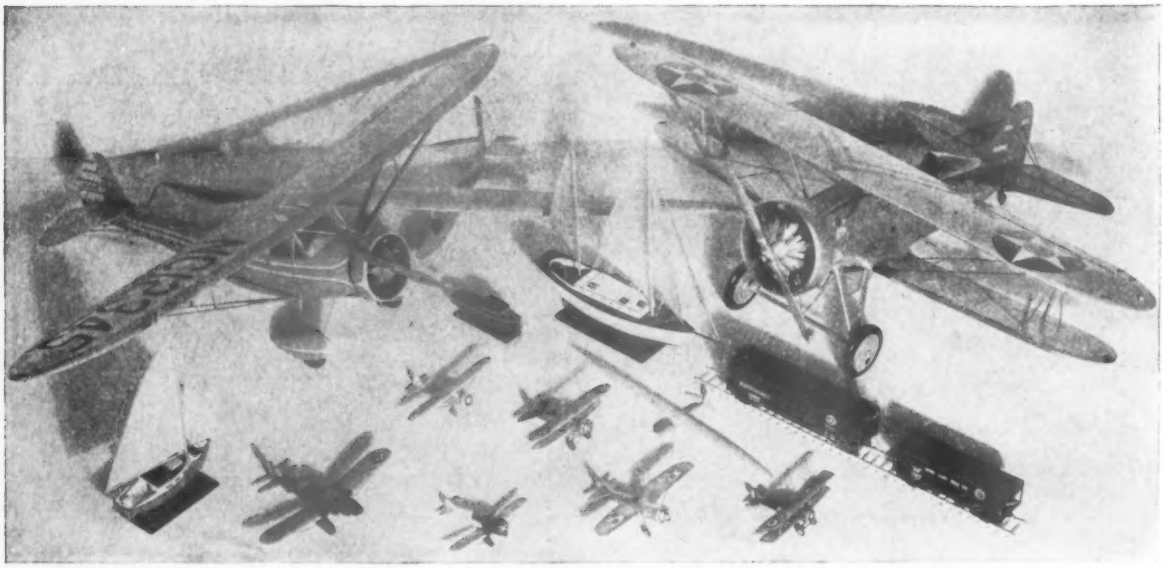
No. 5 music wire, 1 ft.	.01
No. 8 music wire, 1 foot	.01
No. 12 music wire, 1 foot	.01
No. 14 music wire, 1 foot	.01
No. 26 hinge wire, 1 foot, tinned 2 for	.01

RUBBER

Much of the so-called model airplane rubber sold today is not fine para rubber and is not full size as the modelbuilder usually thinks.

3/64"Sq. (.045")	
7-1/2 ft.	.04
25 ft.	.13
210 ft.	.70
1/32 x 1/8"	
7-1/2 ft.	.05
25 ft.	.18

Drawings for Navy Boeing F4B-3 below are almost identical to the Army P12-E described in this issue of Popular Aviation



All these, and more, in the 2nd Issue of "CLEVELAND MODELMAKING NEWS & Practical Hobbies"

For those who still want the '32 Gee-Bee and Heath! (Full details in Feb. POP. AVIATION.) However, please note that the 15c packing charge MUST be included with each kit, or remit $1.15 for each or order will not be shipped. These drawings come only with Issue No. 1 for 25c—Why not subscribe?

It's far ahead of the first issue—and most of you modelmakers thought that was a bang-up start. We hope to keep getting better as we go along. So let's have your wholehearted support—remember it's your magazine—and we want to fill it with the keenest kind of material, drawings, reading matter, etc. The picture above shows you just part of the "construction feast" you get with Issue No. 2. Listen: 3/4" scale Cleveland-Designed standard drawings for a 22-1/2" Boeing Fighter F4B-3 (or F4B-4) and the well-known Monocoupe, 24" span, two extremely beautiful models in their class, 3/8-inch scale Soaring Glider, 1/8-inch scale Boats, 1/8-inch scale Curtiss A-8 Attack, Wedell-Williams, Polish Fighter, Monocoupe, Boeing F4B-3, Sopwith Camel, and Soarer, to say nothing of the two very fine freight cars, well detailed, (not toys but MODELS) a Pennsylvania box car and a Missouri-Pacific coal gondola. To top this off, besides other things, there is a 1/32-inch model of an 1854 schooner (not shown in the photograph), the second of a series of Historic Ships Cleveland-Designed by Captain E. A. McCann. Why,—you can't afford to miss this issue or those following! All FULL-SIZE PLANS for articles described!

Send Your Subscription TODAY — See Coupon for Rates!

"Attached to this letter you will find $1. in cash for a one-year subscription to 'Cleveland Modelmaking News and Practical Hobbies.' Your magazine has been a revelation to the modelbuilders in this town. We hope that you will keep up the good work."—Mt. Morris, N. Y.

CLEVELAND MODEL &

"Model Engineers Since 1919" **1866-PAD WEST 57th ST., CLEVELAND, OHIO, U.S.A.**

for Parts & Supplies - UNTIL

famous CLEVELAND ◇ DIAMOND extra fine quality Materials!

RUBBER—(Continued)

210 ft.	1.10
1/32 x 3/16" 7½ ft.	.07
25 ft.	.25
210 ft.	.70

PROPELLER ASSEMBLY PARTS—

Hubs

Right hand Hubs slotted and drilled for No. 8 MW ¼ x ¾" ..... .03
Right hand Hubs slotted and drilled for No. 12 MW 5/16 x 15/16" ..... .04

2 Bladed Spinners Only (No 3 Blade)

Right hand Spinners slotted and drilled for No. 12 MW ¾ dia. x 9/16" ..... .07
Right hand Spinners slotted and drilled for No. 12 MW 1-1/8 dia. x ⅝" ..... .10
Right hand Spinners slotted and drilled for No. 12 MW 1-¼ dia. x 1-⅛" ..... .10

We Want 10,000 Dealers

to write immediately for our new Dealer Prices (Clubs and Manufacturers also) on the complete line of Cleveland Diamond Parts and Supplies. See for yourself if it isn't just THE opportunity you've been waiting for to boost sales with a bang, and make new friends. Don't delay! Rush your request at once—a postal will do! **You'll never regret it—for you'll save plenty.**

Blades

	Per Pr.
Blades for 6-½" dia. x 1-⅛ Propeller	.05
Blades for 7" dia. x 1-1¼" Propeller	.05
Blades for 8" dia. x 1-½ Propeller	.05

All Blades have tabs which are folded when cementing into hub. This tab is cut off if the blades are to be used in Spinners.

Washers (Bronze)

	Per Env.
5/32 dia. to fit No. 8 and 8 wire, packed 12 per envelope	.04
3/16 dia. to fit No. 12 and No. 14 wire, packed 12 per envelope	.04

Bearings Buttons

13/16 dia. x ⅛" (Thin) bearing button	.02
13/16 dia. x ¼" (Thick) bearing button	.02

INSIGNIA (Cocards)

	Pr.
Star in circle insignia 1"	.01
Star in circle insignia 2"	.02
Star in circle insignia 3"	.03
Maltese German Crosses 1-½"	.02
Maltese German Crosses 2"	.02
Maltese German Crosses 3"	.03
Polish insignias 1"	.01
Polish insignias 3"	.03

Many others in No. 11 Price Sheet. Send for it—It's FREE.

NEW LOW PRICES!

on the entire Cleveland-Designed Line of Kits of authentic Flying Models—Quality unchanged

Authentic ¾ in. Scale. Spans Range 15" to 33"

SF-1: Sport-Trainer	$1.95	SF-14: Fokker Triplane	$1.95
SF-2: Mystery Ship	2.75	SF-15: Fokker D-7	1.95
SF-3: DH-4	2.75	SF-16: Albatross D-3	1.95
SF-4: Curtiss Jenny	2.75	SF-17: L. Bayle's Gee-Bee (1931)	1.50
SF-5: Laird Solution	1.95	SF-18: H. Racer Pete	1.00
SF-6: Polish P. 6	2.50	SF-19: Supermar. S6-B	1.95
SF-7: C. Helldiver	2.50	SF-20: Hawker Fury	1.95
SF-8: Boeing P 12 C	2.50	SF-21 Hawk P.6E	1.95
SF-9: SE-5	1.95	SF-22: Akron Fighter F9C-2	1.95
SF-10: Sopwith Camel	1.95	SF-23: Boeing P-26	1.95
SF-11: The Quad	1.95	SF-24: Lockheed Vega	2.75
SF-12: Bishop's Nieuport Scout	1.95	SF-25: Cur. A-8 Attack	2.75
SF-13: Spad 13	1.95		

¾" "N" Type Supplies Kits—(Do not include Drawings)

N-1: Heath Parasol	$1.15	N-3: Monocoupe	1.40
N-2: Gee-Bee Super-sportster	1.15	N-4: Boeing F4-B3	1.40

These prices include 15c service charge

Authentic ⅜ in. Scale. Span 29"

JSF-1005: High Performance Boeing Bomber $1.95

⅜ in. Scale Semi-profile. Spans 27" to 37½"

FL-301: Amphibion ... $1.50
FL-302: Trimotor 1.50
FL-303: Pirate Bomber $1.50
FL-304: Commodore .. 1.50

Large Outdoor Profile Fuselage Models Spans Range 33" to 36"

FL-201: C. Robin $1.50
FL-202: C. Sirius 1.50
FL-203: Cleveland Bull Pup $1.50

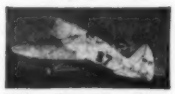
⅜ in. Scale Profile Fuselage Models. Spans Range from 10" to 18¾"

FL-101	Two Gliders	75c	
FL-102:	G L Trainer	75c	
FL-103:	Fleetster Monoplane	75c	
FL-104:	Boeing P-12	75c	
FL--105	Eaglerock Bullet	75c	
FL-106:	(Discontinued).		
FL-107:	Mystery Ship	75c	
FL-108:	Boeing Mail	75c	
FL-109:	(Discontinued).		
FL-110:	Vought Corsair	75c	
FL-11:	Lockheed Sirius	75c	
FL-112:	Curtiss Falcon	75c	

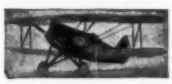
Now Everyone Can Afford to Build Famous "CD" Models

Cleveland Model Making News
I'D LIKE TO SEE THEM DESIGN A REAL EASY, BIG SCALE FLYING MODEL FOR SOME SUMMER FUN.
HEY GANG! I FINISHED A 3 INCH SCALE PLAN FOR IT SUNDAY. IS SPORT I'M GOING TO WRITE AND SEE IF THEY CAN DESIGN A PENNSYLVANIA DOX CAR, A C.C.C.& St. L. CABOOSE, AND LATER A PASSENGER CAR OF THE SANTA FE LINE.
YES BILL ONLY SUBSCRIBERS CAN BUY THESE C.D.'M KITS AT SUCH A LOW PRICE. I COULDN'T PASS UP THIS BARGAIN.
IT'S EASY TO WORK FROM THESE C.D. PLANS. AND THERE'S A LOT MORE COMING.
OH BOY! JUST LIKE THE REAL GLIDERS
IF THEY DO IT'LL BE A REAL JOB

1917 Richthofen's Triplane. Span 17⅝"; length 13¾"; weight 1.8 oz. Colored all red. Kit **SF-14, $1.95.**



1930 Howard Racer Span 15"; length 13¼"; weight 1.3 oz. Colored all white. Kit **SF-18, $1.00.**



1930 G. Lakes Sport Trainer. Span 20"; length 15¼"; weight 1.5 oz. Colored International orange and black. Kit **SF-1, $1.95.**

1931 Supermarine S6-B Span 22"; length over all 21⅝"; weight 2.9 oz. Colored silver and blue. Kit **SF-19, $1.95.**

All photographs on this page are of actual "Cee-Dee" models. We never use photos of the real ships in advertising our models.

Read before Ordering—Avoid Delay

1. Terms: Strictly cash-with-order. C. O. D.'s not accepted. Postage stamps and foreign coins not accepted. Send postal or express Money orders, or checks. Cash is risky.
2. No order accepted under 50c (plus packing charge.)
3. Prices: Subject to change without notice. All prices include shipping, post-free, but 15c packing and handling charge on all orders for supplies only, **must** be included with every order. ("N" kits already have the 15c (charge added.)
4. When ordering, write clearly, especially name and address; use one line for each item ordered.
5. Everything guaranteed to be as represented, or your money refunded. (Return nothing until receiving our written permission.) We assume no responsibility for goods damaged in transit, for we pack securely. INSURANCE 5c EXTRA.

FOR THOSE WHO WANT ALL CURVED PARTS PRINTED ON BALSA

These four Kits contain Balsa Already Printed Out and Numbered. Not simply a few rubber stamped pieces—but **all** the irregularly shaped parts printed out. This simplifies and authenticates construction—merely cut out numbered parts and assemble right on the drawing.

1932 Curtiss F9C-2

Known as Akron Fighter. Span 19⅛"; length 15⅛"; weight 2.2 oz. Silver and blue. Kit **SF-22, $1.95.**

1932 Boeing P-26

Formerly XP936. Span 20¼"; length 17⅞"; weight 2.5 oz. Colored yellow and olive drab. Kit **SF-23, $1.95.**

1932 Lockheed Vega

Span 30¾"; length 21"; weight 3.7 oz. Colored red and gold. Kit **SF-24, $2.75.**

1932 Curtiss A-8

Span 33"; length 24"; wt. 4.7 oz. Colored yellow and olive drab. Kit **SF-25, $2.75.**

Canadian and Foreign Customers

Our prices are in U. S. dollars and cents, so be sure to remit the proper amount of your money to equal this standard. Customers in Canada and British Isles add 15%; all other countries add 25% for Foreign Service charge. Customs tags are made out to our list prices. Use International Money Orders. If puzzled on remittances, customs, etc., see your local Postmaster.

Ask Your Dealer for "Cee-Dee" Kits

for the Cleveland-Designed Flying Models you want. If he hasn't or can't get what you're after, don't accept substitutes, but order direct.

Handy Order Coupon

CLEVELAND MODEL & SUPPLY CO., Inc.
1866-PAD West 57th St., Cleveland, Ohio, U. S. A.

Enclosed is $..... for which please rush items on attached list (or written on page margin.)

( ) Sample copy of "CLEVELAND MODEL MAKING NEWS & Practical Hobbies"—25c. (includes large ¾" scale drawings of '32 Gee-Bee and Heath while they last. 25c creditable against subscription price if second individual copy is not purchased).
( ) Copy of Issue No. 2 ..... 25c
( ) Subscription for six issues of C. M. News & P. H. (including 1st issue) $1. (Saving 50c.)
( ) Subscription for twelve issues of C. M. News & P. H. (including 1st issue—and to same address only) $1.75. (Saving $1.25.)
(Canadian and Foreign Orders for C. M. NEWS & P. H. add 5c extra per issue ordered.)
( ) 15c packing charge on Supplies. This must be included regardless of amount.

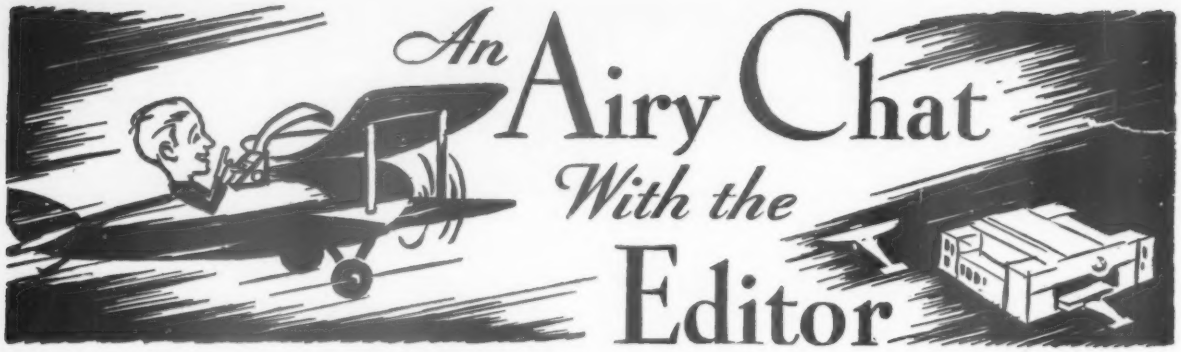
NAME..... AGE.....

Address .....

City ..... State .....

SUPPLY CO., INC.

"Cleveland Designed Kits and Cleveland Diamond Parts and Supplies are Sold and Used in 42 Countries Throughout the World."



An Airy Chat With the Editor

WELL, it's April, fellows, and the good old flying season heaves in sight once more. It's still raw and chilly most of the time and the fields are inclined toward muddiness, but still this is better than mountains of snow, ice and a sub-zero temperature.

And, where states do not prohibit, they'll be lugging out the old crates giving them the annual cleaning up. New covering on this one, a new tail group on that one, a fresh coat of varnish or dope on the t'other and so on. And mebbe some guy, more fortunate than the others will be exhibiting a new prop or a new engine that will kick her along beaucoop m. p. h. faster.

But in those states where amateur flying has been condemned as a crime, all will be silent. The festive spring will mean not a thing, and the little home-built crate will moulder where it stands. Tall weeds and a streak of rust will mark the place where the legal anti-aircraft fire has brought down the amateur flyer. Well, perhaps the lightplane association can get things straightened out before fall.

* * *

ONE of the bunch came into the office last week and let go this definition which we think is quite nifty. Sezze, "an airport is an airminded cowpasture" and we larfed and larfed.

* * *

WHICH also reminds us of another crack that came in and gave itself up 'way back in 1909 or 1910. This definition ran to the effect that "An airplane is a bunch of junk gone crazy with the heat."

* * *

LESLIE LONG certainly started something when he declared that the monoplane is superior to the biplane type for small ships. Since his article appeared in the March issue, there has been a steady stream of protests from biplane boosters, some of which were illustrated by photographs of successful small biplanes.

One biplane adherent even went so far as to list all the small biplanes of history, starting with the Rheims Curtiss and then down the line, not forgetting the Sperry Messenger, the baby Bellanca, the Ace nor any of the other famous old baby biplanes.

From our experience, the only objection to the biplane is the extra work involved in building the second wing. More spars, more ribs, more everything. Once upon a time, the biplane stood supreme in the hearts of amateurs, and now the monoplane is the favorite. Styles and fashions change and possibly there is another biplane era ahead of us.

* * *

THEN we have another controversy on our hands that has its comic features. This argument is based upon the subject of "who was the first woman airport manager." About once every week, for the past 52 weeks, we have received an article headed, "America's First Woman Airport Manager," and each time a different name was mentioned.

We have had Marys, Margarets, Ingebors, Rebas, Revas, and every other conceivable feminine monicker promoted as being the first cow-pasture boss. And they are of all nationalities, Murphy, Smith, Schmidt, Rocco, Lipinski, Lathrop and McCarthy. Oh, oh, please tell me who was really the first woman airport manager, else there'll be another fatality recorded by the headlines.

* * *

ONE of the features of our model contest, and one of the most interesting features, is one that was not originally contemplated by the entrants. And this was the best method employed for packing the models for shipping. As the writer, J. B. R., personally pulled each model out of its crate, box, suitcase or tank, he can vouch for the success or failure of many of the arrangements adopted.

Some models were simply chucked into a cardboard box, which gave our repairman plenty of work. Certain others supported the model by packing soft tissue paper around it and the pressure of the paper forced the struts, stay-wires and other small parts out of place or broke them.

And now we will get into the fancy packing methods which were more or less successful. In one case, the model was secured to a small platform by linen tape, and the platform in turn was supported from the sides of the packing case by strong brass springs that took up all the shocks. This model came through unscratched and in perfect condition.

And then there were several models that were supported from the box by rubber strands, and without the use of packing material. Almost without exception these models came through without breakage. The elasticity of the rubber absorbed all shipping shocks.

Still another method in favor was the clamp method which was neither so hot nor so bad. A big wood clamp was made and screwed to the bottom of the box, and the fuselage of the model was securely held in the padded jaws of the clamp. There was very little breakage—but it is not so reliable as the rubber band suspension method.

* * *

WHO was it that said that an ornithopter or flapping wing ship couldn't fly? Well, just tell this person that we have one in the model contest that can fly—and that can fly plenty. It goes flip-flopping along with all the nonchalance of a cornfield crow and has awakened thousands of Chicago model builders to the possibility of building ornithopters for a change.

* * *

IN this issue we have put a full page view of a modern ship on the inside front cover to take the place of the war history drawings. We'd like to know how you like this change, if you do, and the only way that we can find out is to have you write and tell us. This change was made in response to a number of requests made last month, but perhaps these fellows don't represent the majority of our readers.

* * *

WE feel quite honored by a letter received from the International Aviators Association, Paris, France. This letter asks for our opinion as to what American pilot did the most to advance aviation safety during the year 1932. This data is to be used in awarding the Harmon Aerial Safety Award, and applies not only to airplane pilots but to balloon pilots, dirigible pilots and all persons engaged in aerial navigation. And just as a check on our own opinions on this subject, we would like to hear your views.

* * *

WE have put the matter of a lightplane association right up to the Howlers. We must push this matter

(*Continued on page* 269)

XUM

POPULAR AVIATION

Combined with Practical Mechanics; Including Aeronautics and Aviation Stories and Mechanics

A MAGAZINE FOR THE PROMOTION OF AMATEUR AVIATION AND PRIVATE FLYING

Volume XII | APRIL, 1933 | Number 4

TABLE OF CONTENTS

Feature Articles

AN AIRY CHAT WITH THE EDITOR 210
SPINS — AND HOW TO GET OUT OF THEM 212
CHAPMAN WAS THE FIRST TO DIE 215
PHOTO PHANS CLUB 216
AIRPLANES AID THE FORESTER 217
AVIATION AS IT USED TO BE 219
THE CRUCIAL MOMENT IN DIVING 221
YARNS FROM THE AERIAL HIGHWAYS 223
THE STATUS OF THE AIR CORPS RESERVE PILOT 224
FIRE EATER FARLEY 225
COMPLETE DETAILS OF THE BOEING P-12E 227
P. A.'S AIRPLANE PHOTO CONTEST 228
LATEST VACUPLANE DEVELOPMENTS 229
QUESTION AND ANSWER DEPARTMENT 230
THE CAPRONI FLYING BARREL 231
WE NEED MORE AIRPORTS 232
PROGRESS MADE IN L. A. A. DRIVE 233
HOW TO BUILD THE CORBEN JUNIOR ACE 235
WELDING AND BRAZING METHODS 237
WHAT OUR READERS ARE BUILDING 239
PRIZE WINNERS IN P. A. MODEL CONTEST 240
BUILDING THE BOEING P-12E MODEL 245
DREAM SHIPS BY OUR DREAMERS 250
BARTER AND EXCHANGE DEPARTMENT 251

THE PICK OF THE BRIEFS

The Army Tests the New XP-934 214
Revolving Wing Makes Its Appearance 214
Propeller Cowl Ring Aids Performance 216
French Airmen on Long Hop 216
A Noise Dectector Developed 218
An Aerial Hitch-Hiker 220
An Air Yacht for the Prince of Bibesco 220
Details of External Bomb Racks 222
Testing Planes for Mt. Everest Flight 226
Italy's Latest Duplex Seaplane 226
Latest Beacons for Federal Airways 226
Lightning Strikes an Airplane 230
British Powered Gliders are Interesting 234
Coast Guard Gets New Ships 234
A Plane With a Gear Shift 236
Synchronizing Engines 236
Monoxide Gas May Prove a Menace 236
Are Rotary Engines Coming Back 238
Galoshes and Skiis for Airplanes 238
Canadian Planes Have Liberty 239

POPULAR AVIATION, Volume 12, Number 4, April, 1933. Published monthly by Aeronautical Publications, Inc., at 608 South Dearborn Street, Chicago, U. S. A. William B. Ziff, Publisher; B. G. Davis, Editor; John B. Rathbun, Managing Editor. New York Office, 551 Fifth Avenue, New York City. Subscription $2.50 per year, single copies, 25 cents, foreign postage, $1.00 per year extra. Contributors are especially advised to retain copy of their contributions, which must be accompanied by return postage. All such material will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Any copy accepted is subject to revision or changes to meet the requirements of this publication. Payment for copy used will be made at our current rates. Entered as second-class matter, January, 24, 1933, at the Post Office, Chicago, Ill., under the act of March 3, 1879. Additional entry, Springfield, Ohio.

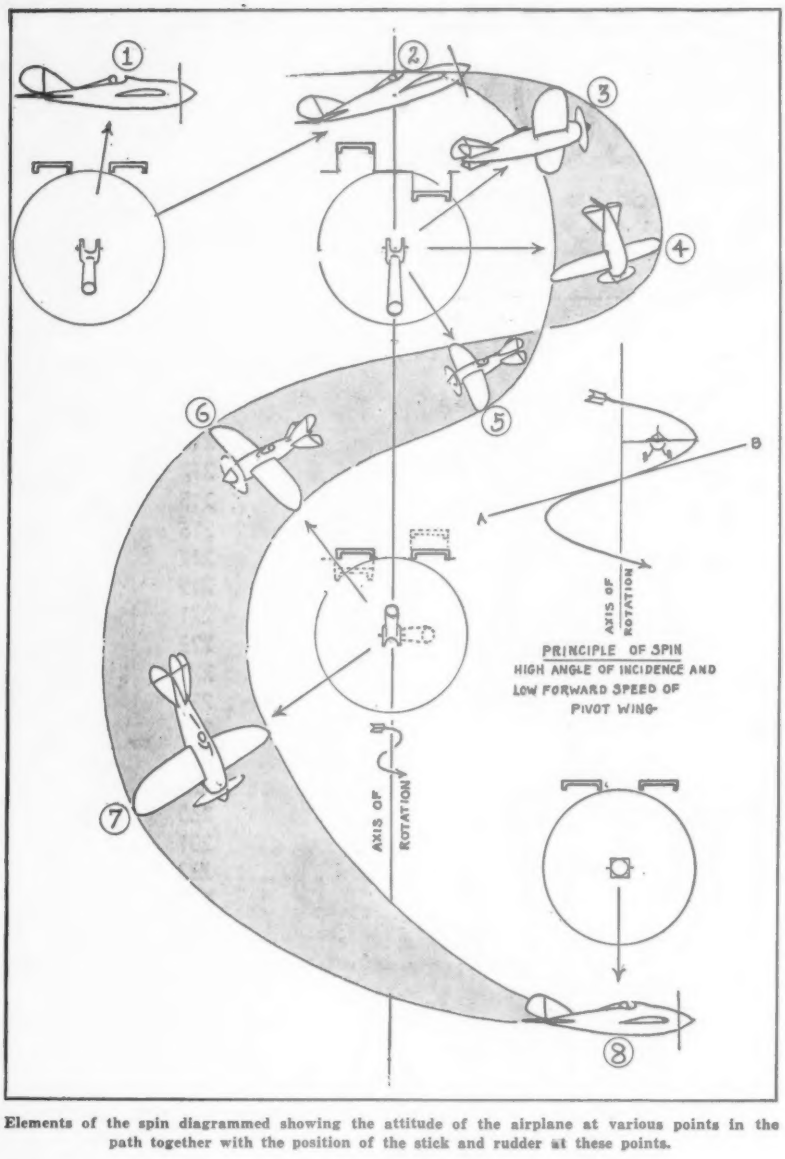
SPINS—

by

CLARENCE CLABAUGH

Instructor in Aerobatics and Director of Curtiss-Reynolds Airport.

As told to LARRY LESH



Elements of the spin diagrammed showing the attitude of the airplane at various points in the path together with the position of the stick and rudder at these points.

MUCH water has run under the bridge since Walter Brock's foot slipped off the rudder-bar of a Bleriot in 1910, starting the first spin recorded in my memory. That first spin was an accident, fortunately with no sad consequences, but there have been plenty of the other kind since that time.

The cause of the spin was a mystery in the days of the Early Birds. Positive cure, for all except the most obstinate cases, was only worked out during the War and the full scientific study is not yet complete. Even the National Advisory Committee of Aeronautics, from whom all blessings are supposed to flow, took it on the nose from Old Man Spin when they issued Report No. 273 with the conclusion that "a monoplane is incapable of flat spinning," whereupon several monoplanes promptly proceeded to do that very thing.

The student, or prospective student of aerobatics, will soon learn that there are decided differences of opinion among experts as to how various maneuvers—including the spin—are best performed. This series of articles will be based on the instructions of Clarence Clabaugh whose idea of a good time is to do 64 spins in one direction, flop over on his back and spin six times upside down.

From this, the reader will gather that Clabaugh believes in spins and knows his aerobatics. He explains their value to the student and also to the licensed pilot as a necessary experience for safe flying in emergencies and under abnormal conditions. The value of training in acrobatics to pilots intending to qualify for military, exhibition or test jobs is of course unquestioned.

I have mentioned that there are differences of opinion among pilots as to just how various maneuvers should be performed and in fact I have never met two instructors who were in complete agreement. This does not mean that all instructors are wrong but rather that there are several alternative ways of doing the maneuvers and the methods also depend somewhat upon the type of ship being flown.

Constructive criticism of flying technique by pilots who really know how to fly will probably do more to promote safety in flying than any one thing and if this series of articles manages to stir up some discussion of the subject and brings out new points it will have served an important purpose.

MOST airplane accidents today are caused by "cockpit trouble" or brain flurries. Experienced instructors agree that adequate training in certain essential maneuvers, called "aerobatics," would have enabled a number of pilots to pull themselves out of the particular jam which caused their grief.

These difficulties will be explained in detail, but it is hoped that enough has been said to convince the fledgling that aerobatics is an essential and necessary part of flying and that if he does not get plenty of instruction along this line he is headed straight for trouble.

There are so-called instructors, who for one reason or another, will minimize the value of maneuvers such as complete and partial stalls and spins as a part of training. The best thing that a student can do, when he finds himself up against this form of incom-

XUM

and How to Get Out of them

THIS is the first of a series of articles by Clarence Clabaugh, one of the foremost instructors in aerobatics.

Here he tells how to master the "spin," once considered the most deadly of all aeronautic predicaments. Mr. Clabaugh is a master in bringing a ship intentionally into a spin or bringing it out safely and easily after it has once started.

plete instruction, is to pack his helmet and goggles in the old suitcase and go find himself another instructor who will teach him how to boss an airplane rather than pet it.

Since the spin is the final result of any serious mistake or series of mistakes in flying and since the spin when uncorrected, will result inevitably in a crash, it behooves the student to spin intentionally and intelligently so he will understand cause, effect and correction. The spin is the simplest and most easily executed stunt in aerobatics and must be mastered before other maneuvers are attempted since failure to execute other maneuvers properly will almost surely terminate in a spin.

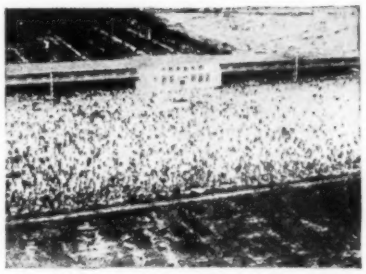
The general cause and principle of the spin is relatively simple and should be understood by the student before he attempts the maneuver, before he attempts a stall or flies a ship into a position where a stall is possible. This will include even a relatively steep climbing angle where the motor may stop and bring the whole matter to a head before he is prepared.

Examine the small diagram entitled "Principle of Spin." Here we see an airplane descending in such a way that it pivots about a vertical line called the "axis of rotation." The inner wing tip descends vertically and has no horizontal motion or forward speed while the outer wing tip follows a spiral path.

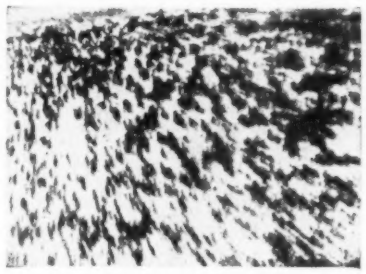
The angle of attack on the inner or pivotal wing is 90 degrees with respect to the air and its only action is like a parachute to retard vertical descent. And we know that a wing cannot support an airplane by parachute action alone.

The outer wing, on the other hand is travelling at considerable speed along its spiral path and has an angle of attack which gives considerable lift. For all practical purposes the airplane might have just as well lost its left wing so long as it remains in the spin, so far as any support is concerned from this side.

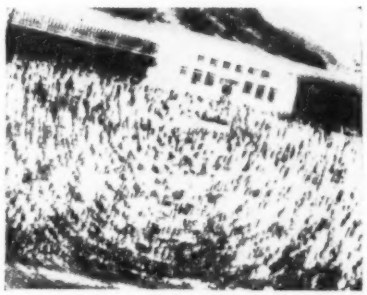
Now, in the words of Clabaugh, "get in a good airplane, have a good parachute under you and grab yourself a lot



The grandstand as it appears just before the spin is started with thousands of spectators viewing the aerial maneuvers. Just an every day scene from an airplane.



And now the pilot starts the spin by stalling the ship and bringing her over on one wing, causing the view to be blurred with movement along parallel lines. The spin now starts.



The ship is now starting to turn around her axis with a rotary motion, and the blur lines therefore show as circular arcs. The ship has lost altitude for the building now appears much larger.

And now the ship is spinning furiously, so fast that it is impossible to distinguish any objects at all. This is the dizzying swirl that confused so many of the early flyers when they were caught in a spin.

of altitude—say 4,000 to 5,000 feet. Be sure you have an aviator in the front seat and go through the motions shown in the larger diagram which you have previously studied with care —on the ground."

WITH the motor well throttled, slowly pull back on the stick as shown in Fig. 1 until you have stalled the ship to about the correct angle for an imaginary landing as in position (2).

Lose your flying speed slowly and completely so that at the moment of complete stall and just before the nose drops, the control stick will be way back as shown in the second control diagram. Just as the nose drops, kick full left rudder and the left wing will drop as shown in position (3).

This is the start of the spin and you should thoroughly understand what happens and why it happens. When you kick left rudder the ship swings to the left which speeds up and elevates the right wing and also reduces its effective angle of attack well below the burble or stall point.

The left wing, however, is pushed down which increases its angle of attack far beyond the stalling angle and at the same time this wing is slowed up on account of being on the inside of the turn so that all conditions contribute to loss of lift on the left side. The plane now spins around the "dead" wing as on a pivot, the "tightness" of the turn and the speed of rotation depending on the type of ship.

During the spin, the stick is kept clear back and left rudder full forward as at the start. The fact that the ship is diving, with the stick back, is the thing that is apt to alarm and unnerve the novice since instinct and previous flying experience tell him that with the stick back in his stomach the nose should come up.

A glance at the air-speed indicator, however, will tell him that instead of being in a fast dive where the controls would be effective, his speed is actually below the stalling point. Another reason why the nose will not come up, although the stick is clear back, is the fact that the plane in a normal spin is almost in a vertical bank and the elevator is functioning as a rudder to hold the ship in the turn.

THE "come-out" for the normal spin is quite simple and logical once the above principles are understood. First, we know that the ship is in a stall so we push the stick forward to get flying speed. At the same time, we must remember that the down position of the elevator flaps is tending to unwind the spiral by pulling the tail

towards the axis of the spin and forcing the nose of the ship away from axis of rotation.

As the spin begins to unwind, we may push right-rudder as shown by the dotted position of the pedals in the control diagram associated with positions (6) and (7) of the ship recovering from the spin. During the actual spin the controls will be rather sloppy and ineffective with the exception of the elevator which may be depended on to start the corrective action by increasing the diving speed and pushing the nose away from the center of the spin as described.

The rudder will take hold at about the same time and may be followed by aileron action away from the spin or to the right as shown by the dotted position in the corrective position of the controls. With the stick pushed forward, to about neutral the ship will dive and unwind into normal flight.

A word of caution is necessary in regard to shoving the stick too far forward in coming out of a normal spin or to prevent too steep a dive or else throwing the ship into a form of outside spin or spiral. Set the controls as stated, with the stick at about neutral and with rudder neutral or reversed from the spinning position and wait for results.

It takes an appreciable length of time for the controls to take hold in bringing a ship out of the whirling stall called a "spin" and nothing will be gained by thrashing around with the stick and the pedals. In fact any corrective action which may have started will be neutralized and fish-tailing around will still further slow up the ship and increase the stall making the spin still worse.

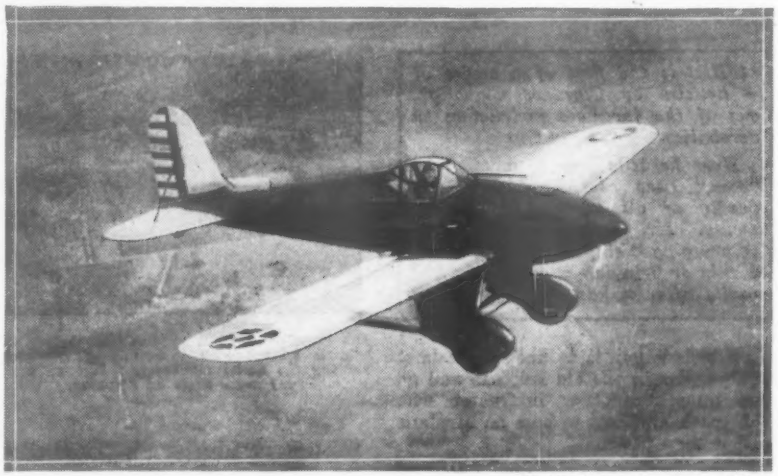
Having described a normal spin in some detail, we will now back-water and see what we have learned with reference to getting out of jams encountered in straight flying.

A great many accidents have happened due to the pilots attempting to turn and get back into the field when their motor stalled at a low altitude or in a climb. Instructors keep drumming this danger into the minds of their students and the students know from reading the newspapers that plenty of accidents happen this way. How many students know just why?

THE first and most apparent difficulty, of course, is the fact that the take-off is against the wind and that a turn going out of the field will mean a down-wind landing. This whole combination of grief builds up against the pilot who tries to "get back home" instead of squashing straight ahead as he should. Remembering what happened in the start of the spin, we find the same condition here without the all-essential element of altitude for safety. To make the story complete, we will add a new factor—gyroscopic precession—in case this is one of those

(*Concluded on page* 261)

The Army Tests the New XP-934



U. S. Army Air Corps Photo

The new Curtiss XP-934 pursuit plane appears much like a miniature A-8 attack ship, having the same body outlines and type of landing gear.

HERE we have a new pursuit ship now undergoing tests by the U. S. Army Air Corps, Materiel Division, Dayton, Ohio. It is known as the Curtiss XP-934 Pursuit plane and it is said to show a most remarkable performance. It will be noted that it employs a liquid cooled engine, and in general appearance it is not unlike the U. S. A-8 attack plane.

Revolving Wing Makes Its Appearance

A DECIDEDLY different sort of flying-machine has been invented by Haviland H. Platt, Philadelphia. It has recently undergone tests at the Guggenheim School of Aeronautics and it is possible that there may be some prospects for a large machine built after the plan of the model shown here.

The Platt machine was invented and patented more than five years ago, and is virtually the same in every detail and principle as the machine recently announced by the German engineer, Dr. Adolph K. Rohrbach. According to Mr. Platt, his invention predates the Rohrbach ship by several years.

Paddle type machines are not so very new but the invention of the Platt machine may eventually disclose some details that are not apparent from the photograph or any data that we have on hand at present. We will probably be able to get some more dope on this ship in the future.

It is logical to assume that the side-wheels are of the "feathering" type, that is, the paddles are evidently arranged to rock back and forth so that they present full area when moving downward and then turn edge on when moving up at the rear.

This is the "side-wheeler" paddle ship proposed by Platt and Rohrbach independently. Models of this type work very successfully but just what would happen with a full size machine is difficult to estimate.

Chapman Was the First to Die

by H. A. LINDBERGH

Lieut. Victor E. Chapman, an American member of the French Escadrille V. B. 108, was one of the first American airmen to lose his life in the air during the World War.

THERE were a number of Americans that signed up with the ground, sea and air forces of the Allies before this country entered the big fuss about a decade and a third ago. Some of these did so as they were soldiers of fortune while others believed that the United States would eventually be involved, so they wanted to be classed among the early birds.

Among the war flyers was Victor E. Chapman, who, as far as it has been possible to determine, was the first American airman to sacrifice his life when fighting in the air with the enemy. This young man, only a few years under thirty at the time, was a great great grandson of John Jay, one of the men who signed the Declaration of Independence.

When the World War started, Chapman was studying architecture in Paris but he gave up his studies to become a member of the Foreign Legion. While serving with this cosmopolitan group, he was wounded, shortly after which he was honorably discharged at his own request to the French government.

Victor then joined the French Flying Corps and acted as a bomber and machine-gunner with Escadrille V. B. 108. During the summer of 1915 he took part in his first "pill dropping" expedition, when one of the Voisin planes of his squadron was destroyed by the German flyers.

This exciting battle in the air renewed a desire that was in common with other young men, who had fought on the ground or in slow responding bombing crates, that of becoming a pilot de chasse, more familiarly known as a pursuit pilot.

In January, 1916, he received training at the instruction center at Avord. This change was a step towards his cherished ambition. When the famous Escadrille Americaine, renamed the Lafayette Escadrille, was formed in the spring of that year, Chapman was selected as one of the seven members comprising the original unit.

He had now attained his objective and it was evident that he did his utmost to carry on his duties at a never seemingly tiring pace. This well liked flyer paid no attention to the admonishments made by the superior officers and comrades to be less drastic in his battles on high. Although Chapman played that dangerous game of air fighting at a fast rate, yet he did not participate in those wild parties generally held by the pilots when on the ground to relieve their tensed feelings.

On May, 1916, when the boys were stationed in the Verdun sector, Bert Hall, William Thaw, Kiffin Rockwell and Victor took off on one of their often customary afternoon patrols. Thaw had downed a Fokker in the morning and was out for another victim, but crashed within the lines. Hall ran out of ammunition when he was in grave danger, but finally escaped.

Victor E. Chapman as he appeared in the uniform of the French Escadrille.

IN this short sketch we read of the intense enthusiasm and valor of the young airmen who fought during the World War. Chapman was only one of many such men who joined the air-forces before America entered the war. They were fighters by instinct — and adventurers.

Rockwell and Chapman (who was wounded) destroyed an enemy plane apiece. Three of the airmen received the Medaille Militaire and the Croix de Guerre with palm, while Thaw was given the Legion of Honor.

The authorities were so impressed with the skill and daring of this flyer that they awarded him this citation: *Chapman, Victor, Corporal Pilot of the Escadrille* 124.

American citizen voluntarily engaged for the duration of the war. A pilot remarkable for his audacity in dashing in to attack enemy planes, no matter their number and no matter what altitude. The 24th of May alone attacked three German planes; fought a marvelous combat in the course of which he had his clothes pierced by several bullets and was wounded in the arm.

Those persistent fighters continued their series of dog fights and other encounters in the air and added a notch to their credit now and then. New members were added to the Lafayette Escadrille from time to time, among whom were included Clyde Balsey from Texas. On his first trip over the lines, when he accompanied a few of his comrades, Clyde was severely injured. He was removed to a base hospital, where the doctors removed nearly a score of metal fragments from his stomach.

The boys visited their sick friends to relieve the strain of being shut in. On June 23, 1916, three of the pilots took off on an afternoon patrol. Chapman was not scheduled to go with them, but did so nevertheless and had intended to visit Balsey at the completion of the flight. The Allied airmen encountered stiff competition in the air and the trio escaped, but Victor was not as fortunate.

According to the French observers he plunged down out of control, but his plane did not burst into flames. The oranges, which he had intended to give to his comrade, were spread on the ground near the scene of the crash behind the German lines. Since there seemed to be incomplete identification marks, he was buried by the enemy under the name of Clyde Balsey.

The mistake was not corrected until several years later when one of his old friends from the Foreign Legion discovered the resting place of the daring flyer beside his wrecked Nieuport. Victor Chapman, who was posthumously honored by another citation, is at present resting in the Lafayette Escadrille memorial near Paris.

While Chapman never attained the prominence that was rightfully his, because of his comparatively brief period of service, yet he richly deserves all of the honors that can be extended to him.

He was not an ace under the rulings the require five or more victories for recognition, but he served his purpose well at a time when military aviation was still undeveloped and when opportunity and luck ruled the destiny of the flyers rather than skill or tactical superiority.

Propeller Cowl Ring Aids Performance

Front elevation of plane equipped with a propeller air deflector cowling. The air is deflected radially into the propeller thus improving the performance.

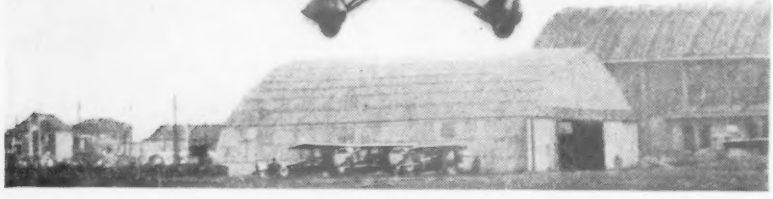
CARL N. HALL and Frank C. Nixon, Compton, Cal., have applied a deflector ring or cowl to the outer circumference of the propeller disc to improve its performance. They claim an improvement in speed ranging from 39 to 140 percent., and that the device will very greatly reduce the landing speed.

Undoubtedly this ring improves the performance of the propeller for the reason that the cowling deflects a certain percentage of the translational air-stream down radially into the blades of the propeller, thereby materially increasing the amount of air acted on by the blades and increasing the thrust.

Tests made on the ground with the plane blocked have shown that the static thrust is almost unbelieveably increased by this method.

Again, this is nothing new for a device of this sort was built and tested shortly after the World War in Chicago by an Ottawa, Ill., inventor who has since applied the same idea to several heating systems. No flight tests were made at the time so that no information is available on the effect of the cowling on flight performance. However, it is believed that this device offers great possibilities.

French Airmen on Long Hop



The French tri-motor plane, the "Rainbow" taking off from the Marseilles Airport, France, for a trip to Buenos Aires, Argentine.

PILOT JEAN MERMOZ and six other persons accompanying him in the tri-motored ship "Rainbow" is shown here just as it appeared before taking off from the Istreas Airdrome, Marseilles, France, for a stage-by-stage flight to Buenos Aires, South America.

This plane made record time across the South Atlantic, but was finally stuck in the mud at Natal, Brazil, before reaching the objective of its flight. However, this was a minor accident that delayed the progress of the flight only a few days.

Photo Phans Club

ALMOST every day we receive interesting letters making this or that request, but at the present time most of the letters have been directed at our new inside front cover feature. Now that they are receiving a full page picture, they believe that this should be in colors. Well folks, we would be pleased to oblige you, but to present this picture in colors would lead to a great deal of complication in printing.

And just here is where we make a suggestion in reference to colors. Why not color this picture yourself? It is really a very simple matter and is a highly interesting pastime because the writer has done this himself. You can work out all sorts of color schemes with colored crayons and you can get some really wonderful effects with only a little practice.

Possibly, after you get your hand in on this work, we may hold a colored picture contest for the best rendering of the pictures on the inside front cover. Here's a possibility for the whole bunch, so write in and tell us what you think about such an affair.

This issue is full of interest for our Photo Phans, with three big features that should appeal to them. First, is the inside front cover for their exclusive benefit. Then comes the detailed picture and plans of the Boeing pursuit ship—the P-12E. Third, is the picture guessing contest that should put all the Phans on their toes.

A lot of you fellows have written in from time to time, proclaiming the fact that you can name any plane at sight—ancient or modern. Well, here's your opportunity to make good. There are only a few of them, seven to be exact, and all of them are once in production or at least well known. There has been no doctoring nor retouching done on any of them.

At the last moment we were argued into the idea of putting the photo swap offers back into the Barter and Exchange Department where they have been reposing for some time. However, we will print personal club notes in this column as before and allow the photo ads to park in the B. & E. until further notice.

You will note that we have replied to the plea of many readers by showing a modern plane as a full page inside front cover picture. We trust that this is the sort of picture you like, but if not, write and tell us so.

Inside Front Cover

THE Army Air Corps has supplied the following data on the Curtiss XO-1G that is shown on the inside front cover of this issue.

Weight empty.....3032 lbs.
Crew .....400 lbs.
Gasoline, main tanks....110 gals.
Auxiliary tank .....36.5 gals.
Total oil capacity.....20.0 gals.
Gross weight.....4994 lbs.

Airplanes Aid the Forester

by FREDERICK A. MARK

The airplane has attained a prominent position as an effective and efficient instrument in the conservation of our forests and timber-lands. And this is only one example of the outstanding value of the plane in modern industry.

A YOUNG man leaned lazily against the wall of his lookout high up in the Rockies. His eyes were focused on a lone eagle sailing without noticeable movement through a turquoise sky.

But as he watched, a faint whine drifted spasmodically down to his ears. Then the truth dawned upon him — he was not watching an eagle, but a forest patrol plane. This incident happened nearly a decade ago. The lookout today is not fooled so easily; he has become well acquainted with the frequent calls of his aerial visitor.

The public, too, has become conscious of the value of commercial aviation. Its first conception of commercial flying was that it only provided a loophole for wartime aviators to continue the "thrill business," and that it had no practical application to national life in peace times. During the last decade the progress in commercial aviation has been so startling, its value so impressing, that it is now looked upon as a standard method of national resource protection.

It would be difficult to estimate the millions of dollars that have already been saved through the use of aerial forest patrol, aerial dusting, and aerial transport, in connection with our timber reserves. The national forest losses during the last twenty years have amounted to $60,000,000, not counting wild game lost and the destruction to scenic reserves.

No other industrial development in so short a time has combated the destructive forces of man and nature so successfully as has aviation. The men, who through sheer courage in the face of financial failure and often in great personal danger, pioneered this work, are worthy of great praise. They fought against misled public opinion, pioneered with unadapted antiquated equipment — but they won.

Loading the forestry service plane with the supplies necessary for combating a forest fire.

It is believed that the first airplane was used for forest protection work in Wisconsin during 1912. The Canadian Government at the close of the World War found itself with a staggering forest fire problem in a vast undeveloped region. The airplanes brought home from the battlefields of Europe were used for scouting planes in their great timber area.

In the United States, experiments were conducted during 1920 in California and southern Oregon. This project was in cooperation with the Army Air Service. The primary purpose of the army was to use the patrol feature to serve as a means of training and seasoning young flyers. Even so, its usefulness was immediately recognized as a forest protective element. In 1925 appropriations were included in the budget to carry out further experiments in this work. The same plan was followed for the next three years, until in 1928 the air patrol was contracted out to private commercial transport companies.

THE new plan was successful. The Forest Service appointed an observer to accompany the pilot. The observers were selected for their experience in fire fighting, knowledge of the country and for their ability as aerial observers.

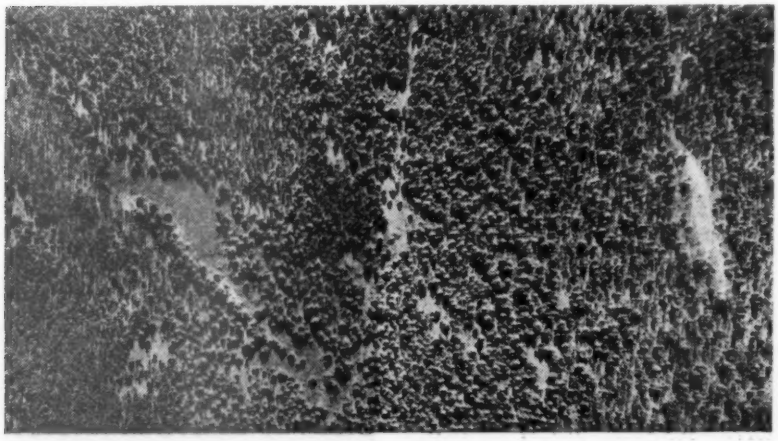
It was not the purpose of this system to take the place of ground lookouts, but merely to aid them and make the whole forest protective unit more effective. Fires in obscure places often reach considerable size before they can be detected from the ground. The discovery of many fires of this nature in Idaho, Oregon, and Washington, are credited to airplane observers.

As the new system got under way new uses for the planes were suggested daily. The airplane is responsible for the discovery of numerous "hang-over" fires caused by lightning. This constant flow of information is of great value in control and suppression of fires.

In scouting large fires, planes give helpful information in reporting progress of the work being done. It is impossible to reduce these values to definite terms in dollars and cents as no one can predict with a moderate degree of accuracy what losses might have resulted in the absence of any special effort at control.

Often planes on reconnaissance flights found that reported fires did not exist. Thus money and time were saved, and men and equipment were kept at locations most useful for emergency cases.

The pilot and observer are provided with the best maps available when on a



A view of densely timbered lands taken from a forestry plane showing how such lands can be inspected and mapped from the air.

scouting trip. Communication with the ground is attained by the use of a message dropper which has a long streamer attached. This message is dropped as the pilot flies low over the lookout point, or the supervisor's headquarters. The method of communication is both simple and quite effective. The next development in aerial forest patrol will undoubtedly be radio communication.

According to N. B. Mamer, operations manager of the Mamer Air Transport, whose planes have flown approximately 5,000 hours in forest patrol work and transport work for the Forest Service during the last seven years without a mishap or severely injuring a single person, the function of the air patrol is as follows:

1. A rapid and effective means of obtaining information in special situations.
2. Confirming information previously reported by ground observation.
3. Making reconnaissance of going fires.
4. Mapping going fires or burned over areas.
5. Scouting blind spots for new fires not visible from ground lookouts.
6. Assisting ground lookouts during periods of poor visibility when all lookouts are hampered because of smoke conditions or haze.
7. In communicating with remote sections and dropping messages and equipment on the fire line.
8. Rapid transportation of forest officials from one point to another during a period of emergency.

Another use is to have forest patrol planes fly over territory, occasionally, acting as a reminder to careless ranchers and campers that the Forest Service is on the job. It also has a stimulating effect on the alertness of lookouts and smoke-chasers, serving as a constant reminder that their work is being checked by a potential competitor.

Practically all of the forest regions of Canada are now handled by airplane protection. In Manitoba and Saskatchewan alone, 66,000,000 acres are protected by the aerial observer. In

(*Continued on page* 254)

Dusting the forest for protecting the trees against destruction by insects.

Portable Engine Starter

Just use an electric cranker for the job.

HERE we have an example of how an electric drill can be used for starting a large airplane engine instead of using the hand crank. The drill shaft is provided with a clevis that slips over a socket in the engine starter, the trigger is pulled and away she goes without any perspiration on the part of the mechanic. In fact, Mechanic Howard Grant really looks cheerful at the job.

An Aspiring Kitchen Mechanic

THE Secretary of the Air Corps Technical School, Chanute Field, Rantoul, Ill., daily has his sense of humor whetted by letters received from applicants for enlistment. One recently received from a native of South Dakota and addressed to the "Manager, Airways Technical Army School, Shanute Field, Rantoul, Ill.," reads as follows:

"Dear Sir:

"I've been reading about you and I've had a scrap with the old hellion I worked for and I'm tired of being a kitchen mechanic and have decided to become a Aviation Mechanic. I am a good girl twenty-two years of age, weigh plenty and never get dizzy. So tell me when I'm to come to Rantoul, because I'm going to join the army or know the reason why."

(Signed by the lady)

NOTE: She was delicately but definitely informed of the reason why.

(*Army Air Corps News Letter*)

Days to Hours

A FEW decades ago it took lumbering freighters a month to deliver goods from the Great Lakes to the Southwest. Now the airplane makes Chicago only an overnight or a daylight flight from Kansas, Oklahoma and Texas. Points as distant as Dallas and Fort Worth are only one-half of one business day from New York.

A Noise Detector Developed

IN the vigorous campaign now being waged against noise in the manufacture of airplanes, the necessity for exactly measuring sound or noises is obvious. We must first locate the point from which the sound comes, its intensity and its nature before we can hope to take effective steps toward abolishing it.

While making sound measurements is apparently a simple matter, yet it is really very difficult for the reason that sound intensity as judged by the ear and sound energy actually resulting from the disturbance are two different and conflicting factors. To meet this problem, a noise meter has been devised by Prof. Barkhausen, an instrument of a comparative type that compares the extraneous sound with a standard sound or standard noise produced by the instrument.

In making the test with the portable outfit, the standard noise is first adjusted. If in perfect tune, a neon lamp will light up over its entire length, but if not correct, with a spotty distribution of light, a knob is turned until the desired note is attained.

A head-phone is held over one ear through which the standard noise is heard while the other ear receives the noise to be measured. Knobs are now turned until the two sounds are of equal intensity and the figures are read from the pointers on the dial. The figures are added, the sum divided by 2, and we then have the exact value of the sound being measured.

Fundamentally, this instrument is based upon the "balanced bridge" idea in which the circuit is adjusted by a potentiometer until the sounds are equal. To our idea this is not so accurate as a "zero reading" type in which both sounds are adjusted to zero audibility before the comparison is made.

Again, the employment of the senses must lead to an error where both the right and left ears of the operator are not equally sensitive to sound—particularly to noise. The idea in general, is very good but before accuracy is attained some refinement in detail is necessary.

Making sound or noise measurements with the Barkhausen instrument.

Aviation as It Used To Be

by STUART STAIR

How they thrilled the public in the old days with the hot-air balloons or "Montgolfiers" as they were then called. Fill 'em with smoke, up they go and finally down comes the "professor" with his cotton chute.

DO YOU remember the good old days of aviation, when the high spot of every county fair was the parachute jump from the hot air balloon?

People came from miles around to witness the event and to stare in goggle-eyed awe at the death-defying daredevil who was to make the leap for life from the big gas bag. Ah, yes, the balloon ascension was something too important to miss and something to discuss for weeks afterward.

However, in these days of high speed scheduled transportation, when the use of the upper air is becoming almost as common as the use of the ground level, the old fashioned balloon ascension has been pushed into the background and almost forgotten. Now and then, however, one is held, and is always well received.

The youngsters go to see what it was that gave the old folks a thrill in aviation, and the oldsters, well, perhaps they like to remember the days when aviation was personified in the thrilling balloon ascension and parachute jump.

The technique of such an ascension is portrayed in the series of photographs, from the laying out of the heating apparatus to the moment when the bag turns upside down, spills the hot air, and plunges to earth in a trail of smoke.

This jump was made recently at McGhee Tyson Airport in Knoxville, Tenn., by T. F. Alexander of New Orleans, who makes all his own bags and chutes. The bag used was seventy-five feet in diameter, and the jumper used a thirty-two foot chute with a nine inch vent in the crown. A small gasoline burner was used for inflation.

No. 1 shows the bag laid out and ready for placing over the burner.

No. 2 shows the bag raised on a pole and held out tent fashion to prevent it from catching fire.

No. 3 shows the bag beginning to take shape from the hot air inside it.

No. 4, the bag is about ready to rise. In Fig. 5, up she goes! The jumper is dangling underneath in his chute harness, with the chute stretched out above him. The chute is not packed, but merely attached by its crown to the balloon. There is practically no danger that a chute suspended in this way will fail to open.

In Fig. 6, he cuts loose, and the chute has just started to open; while in Fig. 7 he is floating gently to earth near the airport.

There is a sandbag attached to the top of the balloon, and when the jumper cuts loose, its weight turns the bag over, spilling the hot air, and the bag comes down in a trail of smoke as shown by Fig. 8.

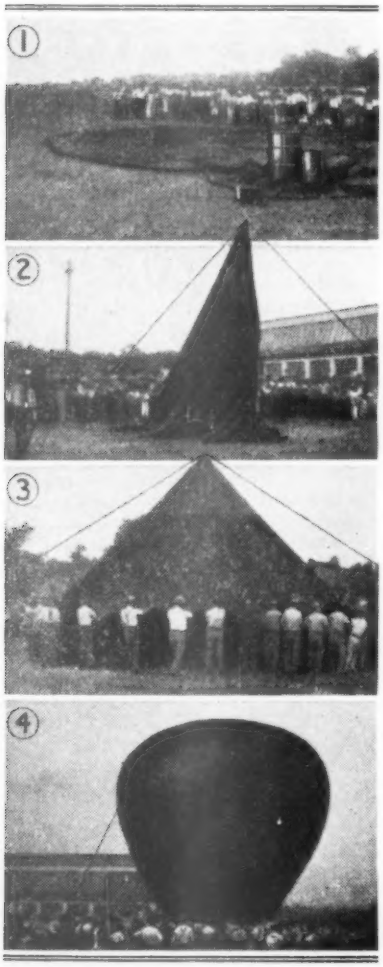
Incidentally, inflation by gasoline isn't the cleanest method in the world and when the jumper landed he was so covered from head to foot by black greasy soot that he was unrecognizable.

It seems a far cry from this primitive form of aeronautics to the present high development of the science, but when one stops to think, it is the balloon that holds the world record for altitude.

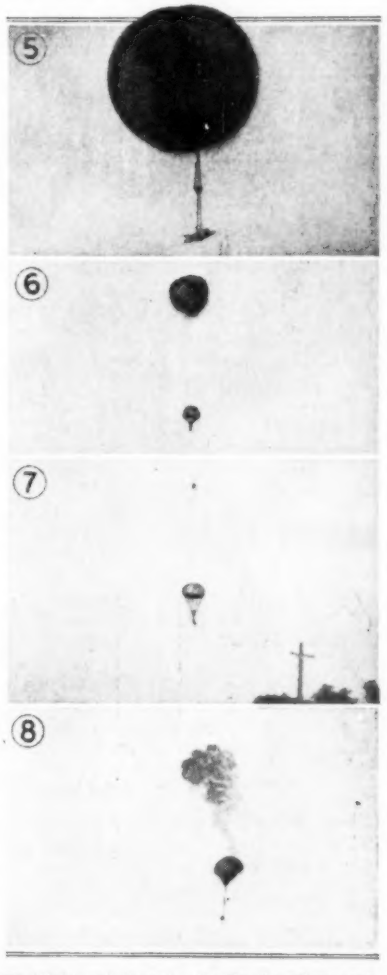
This record was established by Prof. Piccard by his ascension into the stratosphere, and many authorities feel that some type of balloon holds more promise of further knowledge of the stratosphere than do the various types of stratosphere airplanes now in process of development.

While the ascent was spectacular it was quite safe, and the accidents were few and far between. Many an old time balloonist, aeronaut, or what have you, followed the circuses and carnivals for 25 years with few adventures to relate. This is quite remarkable in view of the fact that the hot-air pilot had absolutely no control over his ship.

From recent German photos now being received, it seems that hot-air ballooning is once more becoming popular in Europe in spite of the stunting airplanes. Well, anything for a change, you know, and the populace probably gets a big kick out of the balloon because it is new to them.



Filling the hot-air balloon. (1) The bag is flat spread on the ground. (2) The bag is hoisted on a pole so that it can fill. (3) Holding out the canvas so that it can take shape. (4) Nearly full and pulling hard on its guy ropes.



The flight and descent. (5) Up the sphere goes, with the professor hanging below the chute. (6) He has cut loose. (7) The professor is nearly to earth while the bag is a mere dot in the distance. (8) The bag turns upside down and the smoke escapes.

An Air Yacht for the Prince of Bibesco

LEFT. The specially arranged Junkers plane used as an office, temporary living quarters and as a conveyance.

BELOW. Interior view of the compartments.

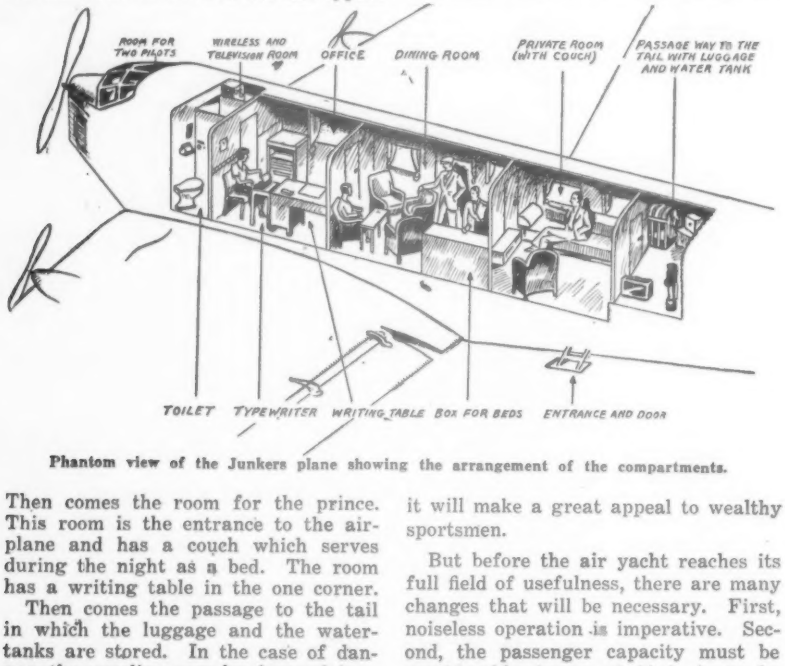
A NEW air-yacht has been finished by the celebrated Junkers-Works, Dessau. The yacht has been built for the Prince of Bibesco, the President of the Fédération Aeronautique Internationale.

This Junkers monoplane, with three Hispano motors, will have a speed of 132 m. p. h. and has an overall length of about 50 feet and a span of 90 feet. The fuel will be sufficient for a flight of about 1200 miles and more without stopping.

As the prince is the president of the F. A. I., he makes many trips during a year and therefore he equipped the plane as a yacht. She has all the necessary comforts for a long journey. There is a room for the two pilots, a wireless station and a television room. A soundproof wall, which is tight against the roar of the engines follows, and then comes the real office equipped with a typewriter and such like.

A large dining and sitting-room is next with a great box in the one corner. In this room is the bed for the typist.

It is believed that this type of plane ushers in a new era for the airplane, and that it will be found to be a successor for the steam yachts and other marine craft used by wealthy men in the past. It can be made just as luxurious and comfortable as a yacht, and at the same time is so much faster that it will make a great appeal to wealthy sportsmen.



Phantom view of the Junkers plane showing the arrangement of the compartments.

Then comes the room for the prince. This room is the entrance to the airplane and has a couch which serves during the night as a bed. The room has a writing table in the one corner.

Then comes the passage to the tail in which the luggage and the water-tanks are stored. In the case of danger, the gasoline may be dropped in a few seconds. The prince intends to travel through Africa and hunt wild animals.

But before the air yacht reaches its full field of usefulness, there are many changes that will be necessary. First, noiseless operation is imperative. Second, the passenger capacity must be considerably increased if it is to be used for the conveyance of a week-end party. This accomplished, international touring will be a fact.

An Aerial Hitch-Hiker

THE experience of Paul Kaiser, the first international aerial hitchhiker, who hid himself in the tail of a Pan American Airways' plane and hitchhiked or "hitchflew" 1700 miles, was not worth the bother, he thinks. True, he had thrills, many of them, but they were not always of the most pleasant kind.

Paul Kaiser, twenty-five years old, is a native of Czechoslovakia. He had an ambition to work in an auto plant in Detroit as a decorator and painter, but lacked sufficient capital to get him to his destination. He paid his passage aboard a German liner from Bremen and landed in Colon, Panama, June 11th. Two weeks later he was in Cristobal, C. Z., which is just across the canal from Colon.

Out at the airport of Pan American Airways he hung around until the field was dark, then went to the big 22-passenger Commodore plane all ready for its flight to Miami the next morning. He slipped past the guard and climbed far into the tail—into a compartment where the baggage is stored. At 6:30 the next morning the plane took off.

Naturally there was little room in the compartment, and the international hobo gradually grew numb. Five hours later at Barranquilla, Columbia, customs and health officials examined the plane, but Kaiser escaped detection. An overnight stop was made at Kingston, Jamaica. Here Kaiser managed to stretch out in the baggage compartment, and by massaging and performing a bicycle movement while lying on the floor of the plane, obtained relief for cramped muscles. Again he escaped detection.

Next day at 4:30 p. m., the plane ended her 1,700 mile trip and landed at Miami. At this point a very thorough examination is given every plane for mosquitoes, for there is always danger of the deadly yellow fever mosquito surviving the short trip and landing in the United States, a most undesirable immigrant as a single member of the Aedes aegypti family is sufficient to start an epidemic. And so when the immigration officer was making his inspection he discovered the stowaway.

A Glider Caterpillar

A GERMAN pilot is the first member of the Caterpillar club to have made an escape from a glider. He is Herr Pisse, a pilot of the flying school in Aachen.

On a recent flight in a glider at Wiesbaden, he was seized by rising air currents and driven rapidly to an altitude of 6,000 feet where the glider capsized. Herr Pisse fell out of the pilot's seat, but made a safe landing with a parachute. Much to the amazement of the crowd watching the accident, the glider righted itself and made a perfect landing without anybody at the controls.

XUM

The Crucial Moment in Diving

by LAWRENCE A. CLOUSING
Aeronautical Engineer and Lieut. (j. g.) U. S. N. R.

The author explains just why a pilot "blanks out" when he pulls out of a fast dive quickly or when a sharp turn is made at high speed. Blanking out has been the cause of many serious accidents in the past.

BACK in 1927, Captain Luke Cristopher of the Army Air Corps Reserve was assigned the work of flying an airplane for certain tests. In the tests he tried his hardest to impose on the airplane the greatest possible stresses. In other words he did his best to pull it apart in the air.

Now most airplanes can almost be broken into pieces in the air provided one tries hard enough. But this was a staunch fighting airplane of the Navy, and Captain Christopher didn't succeed in wrecking this airplane. Instead he did something quite peculiar to himself. Doctors found this out when they examined him. But we'll tell about that later.

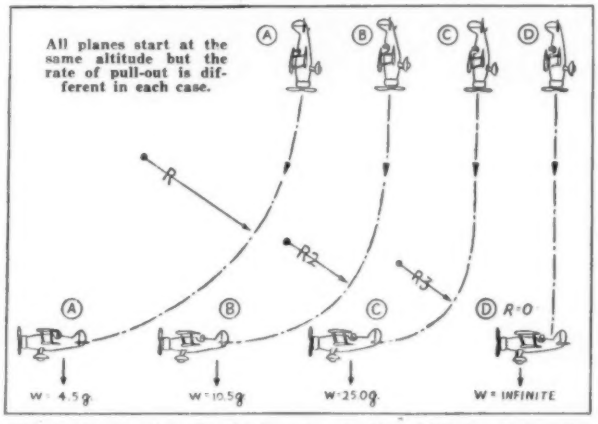
The rudder and elevator controls of some of the 1927 fighting airplanes in the Naval Air Service were failing in use. Not on all the airplanes, but just on some—when pilots put them through their paces. Evidently the loads which actually existed on the rudders and elevators during flight were greater than those which the designers thought would exist. Or, if the total loadings used in the design were OK, they were not being applied at the right places in the structure.

At any rate, something had to be done about it. The designers had to find out where and how great the actual forces were. So the Bureau of Aeronautics of the Navy Department, in cooperation with the National Advisory Committee for Aeronautics, prepared an airplane for test. They proposed to find, by means of taking air pressures at different places on the tail surfaces of the airplane, the actual air forces that were exerted on these surfaces.

For test, Captain Christopher flew the airplane in level flight at all the different speeds of the airplane. That was easy. He tried high steep dives. They were worse but not bad. He tried some ordinary acrobatic maneuvers, such as barrel rolls and tail spins and some very unorthodox flying in which, at high speeds in a dive, he pushed hard on one rudder and then hard on the opposite rudder, thus giving the airplane and tail their maximum swing from one side to the other. But worst of all were the high steep dives from which he had to pull the airplane up into level flight as quickly as he could.

Imagine yourself with Christopher in one of these dives. You are flying level. Then, down goes the nose of the airplane till it points straight at the ground. As you plunge down, the roar of the engine changes to an overpowering whine and the whistle of the wings and wires as they rush through the air becomes a shriek.

Faster and faster the airplane hurls downward. Then, suddenly with a jerk, Christopher pulls back on the stick! He pulls back hard and fast! What a tremendous force is holding you in your seat. You feel as though you were made of lead. Quickly the light dims and everything becomes black as night. You know what you are doing, but you can't see. You're blind!



With the large radius (R), the force is only 4.5g. With the short radius (R3) the downward reaction may be as much as 25.0g. A square turn gives rise to an infinite force.

Now, when Christopher pulled back the stick, this is what happened. The tail of the airplane was forced down considerably and suddenly. This increased the angle at which the wings met the relative air or wind and there was immediately brought into action a tremendous force on the airplane tending to direct it from its line of flight. Yet, because the speed of the airplane was great, its inertia tended to keep going very determinedly in its former direction. Actually, in one dive of Christopher's it placed a force on the wings of 10.5 times the weight of the airplane.

Now can you imagine yourself weighing twice as much as you do now? It would be quite a load to cart around, wouldn't it? But it should not be entirely a new sensation to you. Were you ever in a swing? Remember as you swung down toward the ground from up high, that it seemed as if you sat much harder in the seat of the swing?

Well, practically the same thing happened to Captain Christopher when he was pulling out of the dives, only he didn't weigh a measly twice as much as he ordinarily weighed. He weighed, during one pull-out, ten and a half times as much as he ordinarily weighed and imagine a man weighing about 1800 pounds!

Now such a force is way beyond that for which our blood vessels and heart are intended to stand, so what happens? The blood starts to drain away from the head, thus depriving the brain tissues of the necessary oxygen. It then is hard to lift arms, feet or head, or even impossible to do so.

To persons who are flying for the first time, such maneuvers bring interesting reactions. The normal one is for the novice to let his head drop till he is slumped way forward in the cockpit. His endeavors to bring his body to normal position are met with what seems to them abnormal resistance. The experienced pilot grows accustomed to preparing himself to resist these forces.

On going black, Major Jimmy Doolittle, lately of racing fame, has some interesting things to say. Back in 1925 he ran a number of interesting tests on accelerations of an airplane in various maneuvers.

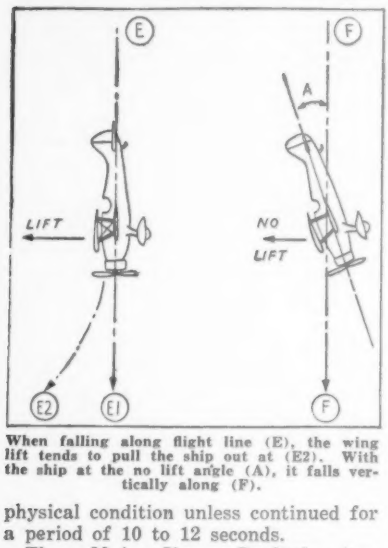
"Acceleration" is the technical word applied to those forces which make a pilot feel heavier in a pull out. The way in which this term is derived is logical. The force of gravity is a definite constant quantity. A body near the earth, when falling, is accelerated downward at a constantly increasing rate of speed. An acceleration equal to that produced by gravity is called by its symbol "g." If the body were accelerated at twice the rate at which gravity would accelerate it, then the force accelerating it would have twice the force of gravity (2g.) and in effect the same body would have twice the weight it had under an acceleration of "g."

But returning to Doolittle's experiments, they were also run primarily for the purpose of determining the stresses in an airplane during violent maneuvers. However, he gathered some interesting data on the effect of acceleration on the pilot. With a recording accelerometer he did loops, single and multiple; barrel rolls; power spirals;

tail spins; Immelman turns; inverted flight; quick pull-outs from dives at various speeds; straight flight with the airplane on its side and normal flight in bumpy air.

He found that of all maneuvers, the one that imposed the greatest acceleration on the airplane and pilot was that of pulling quickly out of a dive.

He says in his report that the maximum acceleration which a pilot can withstand depends upon the length of time the acceleration is continued. He finds the pilot experiences no difficulty under instantaneous accelerations even though they may be 7.8 times that of gravity. An acceleration, however, he says, which makes a man effectively weigh 4.5 times his normal weight if continued for several seconds will quickly cause the pilot to lose his faculties. His opinion is, that while this is disconcerting to the pilot, it is not necessarily dangerous for one in good



When falling along flight line (E), the wing lift tends to pull the ship out at (E2). With the ship at the no lift angle (A), it falls vertically along (F).

physical condition unless continued for a period of 10 to 12 seconds.

Then, Major Jimmy Doolittle gives quite a graphic description of the effect on the pilot of a power spiral of short radius.

He says, "In starting this maneuver, the nose was allowed to drop until a speed of 140 m. p. h. was reached. The airplane was banked to approximately 70°. It required some time for the pilot to establish steady conditions, but a constant acceleration of 4.7 g. was finally obtained.

"After the steady condition was reached, the pilot gradually began to lose his sight and for a short time everything went black except for an occasional "Shooting star" similar to those seen when one is struck on the jaw. The pilot appeared to retain all faculties except sight, and no difficulty was experienced in righting the airplane. Sight returned almost immediately when the acceleration was decreased to normal."

In making slightly steeper turns, he says that the beginning of loss of sight did not seem to occur more quickly. However, the interval between the time of normal sight and the complete loss of it was shorter. In general, Doolittle says the effect of these sharp continued turns is not particularly uncomfortable to the pilot. He describes the sensation as being that of having a tight band around the forehead and a feeling that the eyeballs are about a half an inch too low in their sockets.

Concerning inverted flight sensation he says, "At the top of a loop the stick was held forward in order to keep the airplane on its back. In this position the stick was pushed forward twice and the maximum negative accelerations recorded were—1.3 and 1.2 g. Thus, the pilot weighed but little more than he normally did, though of course upside down. The curious part of inverted flying is that accelerations seem to be much greater than they really are and that they appear to be of much greater duration."

Doolittle has made some interesting calculations on the maximum theoretical accelerations that can be given to an airplane. These, he has arrived at by calculating the load that the wings would receive if at the maximum speed which the airplane would attain in a vertical dive. The angle at which the wings attack the air is instantly changed from that angle of attack in the dive to the angle of attack which gives the wings their maximum lift.

This corresponds to having a pilot dive an airplane straight down 'till it just won't go faster—then instantaneously pulling back on the stick.

In practice, if the airplane can not be brought to the maximum lift instantly, the acceleration will not be as great as the theoretical value, but with balanced control surfaces a pilot can pull back very quickly and come very close to the maximum accelerations. With unbalanced controls this is not possible, and so the maximum accelerations cannot be reached.

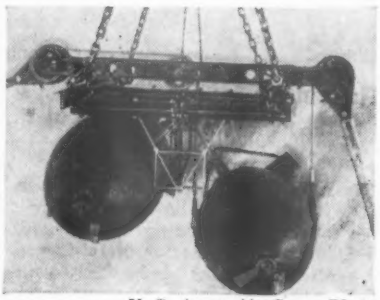
It is interesting to note that the airplane which Doolittle flew during these tests had a theoretical possible acceleration of 19 g and that high speed racing airplanes can have accelerations as high as 25 g. When it is realized that modern pursuit and fighting airplanes are designed only to stand accelerations of about 12 g., it can be readily seen that something must be done to limit the quickness with which the pilot can pull back the stick.

This is accomplished by using unbalanced elevator controls. Up to a speed of 162 m. p. h., which is the highest he went, Doolittle found in pulling out of dives he could approach the theoretical value with an error of approximately 3.5 per cent less. However, the control surfaces were balanced on his airplane.

But to get back to Captain Christopher. Remember that he stood accelerations that were greater by 2g. than any of those experienced by Major Doolittle. Up to his time it had not been known what the limit to accelerations was. Mr. Rhode, who wrote up the experiments on the Navy fighting

(*Concluded on page* 258)

Details of External Bomb Racks



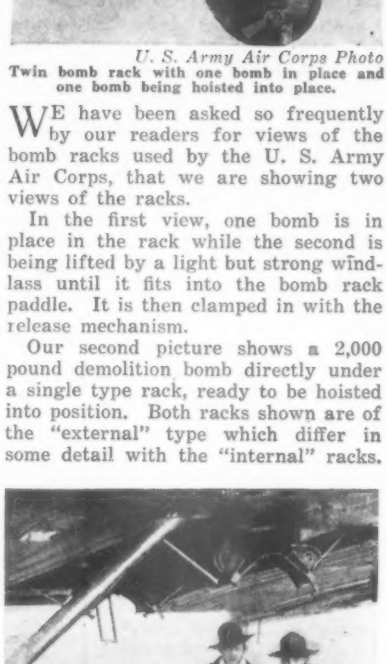
U. S. Army Air Corps Photo

Twin bomb rack with one bomb in place and one bomb being hoisted into place.

WE have been asked so frequently by our readers for views of the bomb racks used by the U. S. Army Air Corps, that we are showing two views of the racks.

In the first view, one bomb is in place in the rack while the second is being lifted by a light but strong windlass until it fits into the bomb rack paddle. It is then clamped in with the release mechanism.

Our second picture shows a 2,000 pound demolition bomb directly under a single type rack, ready to be hoisted into position. Both racks shown are of the "external" type which differ in some detail with the "internal" racks.



U. S. Army Air Corps Photo

A 2,000 pound demolition bomb ready for hoisting into the bomb rack.

A Dirigible Cafe

IN an effort to thrill American tourists and the blase Parisians, a cafe owner in the Montmarte has re-decorated his night club to represent the interior of a huge dirigible's cabin.

The waiters are dressed as stewards, and a "navigator" stands at the controls, while the guests eat, drink and dance. The controls operate an unique system, whereby moving scenery, representing the coast of Spain, the Azores and the Atlantic, float past the windows. Tiny dots of lights inform the "passengers" that they are passing over European metropolises.

But the big thrill comes at dawn. As the guests are leaving, a replica of New York City floats by, and the airship and guests come to earth.

Yarns from the Aerial Highways

by T-2003

Experiences and incidents of all sorts encountered while jogging along the airways. And as usual, fogs play a prominent part in affairs.

BEAUTIFUL blue skies were everywhere on the run up from Washington, until five miles out of Trenton a black looking thunderstorm started me worrying until Hadley Field appeared just on the edge of a tropical cloudburst.

In no desperate hurry to reach Newark, I eased the amphibian down to a landing at the New Brunswick Field. Then, just about to float her in over the wires, I came out of my trance and gave 'er the gun, coming around for another turn.

And then, in full view of an old and critical friend, I gently and contritely let down my landing gear and made the conventional three-point at Hadley. Greetings over, discussion arose as to incidents wherein amphibs. found themselves landing on water with wheels down or on terra-weeda with wheels up. The classic example being a service pilot who had landed in Pearl Harbor with his wheels down, had nosed over, had been pulled upright and bailed out and then proceeded to take off — still with his wheels *down*. No go.

With a sheepish look, he cranked 'em up into their sockets, then bounced her off the waves and flew back to his home field — only to squat her down on the hangar line — still with the wheels *up*.

The Army pilots, before starting their Pan-American flight six years ago, deliberately made a number of wheel-up landings on Mitchel Field with their Loening amphibians and proved to their satisfaction that such landings were not as wearing to the airplane or damaging to personnel as wheel-down landings would be on the water. Of particular interest was the advantage of making a belly-slide on land in case of a forced landing in a small field, as such friction would stop the ship in a shorter space than if it rolled on wheels.

* * *

FOGS, of course, have no place in the summer-time, but there it was, completely blanketing the East Boston airport. The buildings of the city showed up through the wooly covering, but the airport was not visible — except on my map. I was turning around to go down to Buttonwoods below Providence, when the ground fog started heaving up into a huge dome, just where the airport should be. The dome kept getting bigger and also darker in color, until the darkness proved to be the ground. Wasting no time I slid in to a landing.

As I taxied to the line, I noticed a grass fire burning fiercely on the marsh to one side of the airport. It was the heat from this fire which had domed up the fog blanket and then dissipated it. When the fire died, the fog gradually came back, and remained there until noon, when the sun burned it off. Rather chestly at being the only pilot to come in or go out that morning I called on Captain Joe Wilson, who runs the Army Air Corps detachment at the airport and met, among others, a young transport pilot who was also visiting.

Here is a high fog or a low cloud—whichever you choose—just starting to blot out the friendly landscape below. Unwelcome visitors, these fogs.

"I was remarking to Joe, here," he told me, "about the fire raising the fog. I remember coming in to the Washington airport with only the Monument across the river showing up through a typical winter ground fog. The trash dump at one end of the airport was smouldering as usual, and the heat from this little fire had raised up the fog into a beautiful mound. However, the fog hadn't been broken up, so I hightailed it to Congressional Airport outside the city, above the fog strata and landed there.

"Then, about a year later and early one morning, I was coming over the mountains from Pittsburgh, when fog cut me off about 50 miles from Washington. I turned back, but fog had settled down to the ground to the west of me. At Hagerstown I could see the beacon flashing, but the characteristic dot-dot-dash red flashes were obscured.

"All up and down the valley, the fog was on the ground and on the mountain ridges to the West and East the top strata of fog, or clouds, was slowly settling. I had no way of gauging the thickness of the fog that lay on the ground below me, but it couldn't be awful thick or the flashing beacon wouldn't come through it.

"What I had once seen at Washington gave me an idea. Having seen the Hagerstown field by daylight, I knew which direction it lay from the light. Stalling down on top of the strata I released a parachute flare. It must have struck the ground right after it ignited and the parachute opened. Before the flare had burned out, its tremendous heat had opened a hole in the fog. I had to stall in through part of the haze, but I could see the flare through it, and I landed on top of the candle in the clear space it had burned. In fact, I had to ground loop a bit to keep from straddling the flare and burning the fabric off a wing."

* * *

TALK about efficiency. Landed at one field, and discovered two facts. One was I had used up twice the normal amount of gas and the other was its cause — a leaky tank. We later found a piece of lead in it that was *not* solder, as it fitted both the hole in the tank and an ordinary air rifle. Straightened up from tracing the leak and found the airport attendant had already shoved 20 gallons of gas in the tank. And what an argument before he'd take it back!

Commenting on this so-called efficiency I happened to mention the old story of the Commanding Officer of a war-time Army field who was aghast at the waste of time when little TM scouts taxied from the "stage" in midfield to the hangar line to be serviced. It seems that he had drums of oil and gas carted out to the "stage" and like-

wise barrels of water for the radiators. It seemed he knew a horse from hock to hack but not an airplane. TM scouts, you see, had LeRhone rotaries which use *air-cooled* engines.

An old-timer shook his head at the story.

"In substance it's true," he said. "It was at a certain field on the West Coast. But don't blame it on the C. O. Sure, he signed the instructions to the Engineer Officer, but he'd never bothered reading 'em. You see, there was one of these so-called efficiency experts who was acting as the Old Man's Executive Officer at the time. Seems he was the one got up the order. And on the same day, damme, if he didn't take notice of the many forced landings we were having and got out an order informing all concerned that 'forced landings by airplanes at this station are hereby prohibited.'

"Well, you can imagine. Student officers and even lousy flying cadets, would sneak into the headquarters building and take a look at the order tacked up on the bulletin board. The Sergeant Major had sense enough not to have it mimeographed and distributed as he should have done, so the only copy extant was there on the bulletin board. The flying instructors had told their students about it, but they wouldn't believe it until they'd seen it with their own eyes.

"Came one day, when by a freak of fate, the Commanding Officer in his stride down the corridor to his office paused to look at the board. For a while he stared. I was talking to the Adjutant and couldn't help seeing what happened. Suddenly he uttered a loud word, tore the forced-landing order from the board and strode back, hollering for his motorcycle. Around the post he tore.

"In spite of the so-called Efficiency Expert, things were all that they should be and he found no cause for complaint. He hadn't instructed his cyke driver to go out on the flying field but three times he had to tell the driver that he *didn't* want to go out on the field.

"Finally, the driver spilt the beans about the barrels of water for air-cooled engines. With fire in his eyes the Old Man ordered me out there (Yeah, I was the driver). As we neared the "stage" we noticed a lot of confusion, yelling and so forth.

"Well, you'd a died to see what happened. A few minutes previous, the big efficiency man had just gone out to the field for the first time in his career, probably to find out what was wrong there. As he got out of the car he stuffed his pipe in his hip pocket. It must have had sparks in it for all of a sudden the gang of Kaydets, Student officers, Instructors, Mechanics and general Ne'er-Do-Wells saw Mr. Efficiency Man's pants on fire. With a yell, someone grabbed a bucket and with his own water was the E. M.'s personal fire put out. I think it was the Old Man showing up at that moment that prevented a first class drowning."

The Status of the Air Corps Reserve Pilot

U. S. Army Air Corps Photo

The ambition of every Air Corps reserve pilot is to fly the latest army ships, such as the A-8 attack plane shown above. However, this ambition is not often fulfilled.

THE year 1927 marked the beginning of the Air Corps Five-Year program, at which time there was a limited amount of airplanes with their equipment. Commissioned personnel was at a minimum and practically no progress had been made worthy of mention.

The primary object of the Five-Year program was to develop the Air Corps into a highly mobile combat force with which to carry out such air operations as might be necessary in the defense of our country. To do this, required an enormous amount of money and expenditure of government funds for the experimenting and manufacturing of service type airplanes and equipment and extensive training for a great number of pilots.

Qualified candidates were assigned to the training schools, of which practically all were from civilian life. These men converged from all phases of civilian life, giving up their various occupations to enter aviation as a career, to enter the Air Corps with the expressed purpose of making it their profession. The physical examination given these candidates was the most thorough of any known and only a small percentage of those examined successfully passed it.

Upon the completion of the flying training course of instruction at the Air Corps Advanced Flying School, Kelly Field, these men received certificates of graduation and were commissioned 2nd Lieutenants in the U. S. Army Air Corps Reserve with the privilege of making application for and receiving their commission in the Air Corps, Regular Army. Those not desirous of remaining in the Army were offered commercial positions at fabulous salaries.

When the commissioned strength of the Air Corps reached within 203 of its authorized increment, there was an immediate suspension of appointments due to financial difficulties, and the desire of officials to fill the remaining vacancies with commissioned graduates of West Point. The War Department then authorized two years of active duty for reserve officers, but this was soon succeeded by an order involving a reduction in the amount of active duty from two years to twelve or sixteen months. This is insufficient, as it is an entirely too short a period to enable a young officer to become familiar with military tactics. The facts which I am about to reveal will prove this statement.

The tactical squadrons, to which reserve officers are assigned, are composed entirely of reserve officers and I can safely say that the junior grade is filled almost entirely with reserve officers through the Air Corps as the regular commissioned strength is practically nil compared to the other major nations. At the present time, the average squadron is assigned more pilots than it has airplanes, which results in a training difficulty that cannot be avoided under the present circumstances for all pilots cannot participate in every training mission.

In everyday training, this difficulty can be removed by duplicating the mission, but in the cases of annual maneuvers and certain extended cross-country flights, this is not easily accomplished because of the limited active duty afforded the reserve officers. For instance, all officers of the squadron are not able to participate in annual maneuvers, due to the lack of airplanes, and the miscellaneous duties necessary at the squadron station.

It can readily be understood that the junior officers will be assigned these duties in the absence of those on maneuvers. The average reserve officer will not remain on active duty a sufficent length of time to enable him to

(*Continued on page* 256)

Fire Eater Farley

—and How He Won the Cheney Medal

by COLIN K. CAMERON
Editor *U. S. Army Recruiting News*

A thrilling account of how Private Arden M. Farley, saved his pilot from a fiery death at great peril, thus winning the highest award in military aviation for bravery.

WHEN Second Lieutenant William Dum of the Army Air Corps Reserve cocked an alert ear toward the steady pulsing of the powerful engine in his Berliner-Joyce pursuit plane that crisp December morning, he certainly received no intimation that the invisible devils of disaster, gleefully hovering above him even at that moment, had picked him out as their prey.

Even after he had risen from the smooth straightaway that forms the landing and departure area at Selfridge Field, Michigan, and had sped for many joyous minutes through the open sky, the young officer felt no cause for alarm. His eager enthusiasm over the freedom of the skies communicated itself to his passenger, Private First Class Arden M. Farley of the 94th Pursuit Squadron at Selfridge Field.

Farley began to amuse himself with the machine gun, training it upon enemy targets suggested by the ever-changing outlines of the wispy clouds above. He was seated back-to-back with his pilot, because of the fact that the gunner's seat in that model of Berliner-Joyce faces to the rear.

The flying field was many miles behind when the first sign of trouble made itself evident. The motor conked out completely. Try as he would, the pilot could not touch it off again. With a muttered curse and a sigh of exasperation, he pointed the ship toward the ground and scanned the terrain in an attempt to find a suitable landing place.

The few level places in the rolling country offered little encouragement because of the many scrub pines that dotted them. It was with a much louder curse than before that Lieutenant Dum headed for the most promising spot of all, a small field full of hillocks and humps and surrounded by trees. Across the near end of the field ran a high tension power line.

Dodging the trees and ducking beneath the dangerous power line, the pilot dropped his ship at the end of the rough clearing. A perfect three-pointer! Even with power and on a regulation landing field it would have been difficult to have improved upon that landing. But the disaster devils had not forgotten their malicious decision. They watched the ship as it slowly drifted almost to a stop in the field.

"Here's our chance!" they must have cried.

The ship struck a large bump. As it shuddered, steadying itself, the tail

Private, First Class, Arden M. Farley, the hero of this story.

flew upward and over, somersaulting the plane with a horrible crash. The devils snickered with glee. With one last look and a flick of their evil tails at the wrecked plane they whisked invisibly away.

Behind them, practically helpless, they left two men pinned beneath a tangled mass of metal. So great had been the impact with the ground when the plane overturned, that the metal headrest between the pilot's and the gunner's seats had been smashed backward, imprisoning Farley in a steel-like grip.

It was only by dint of the most powerful struggling that he freed himself and effected an escape by crawling out from underneath the wrecked ship. Back on his feet again, Farley realized the danger of fire arising from the yet hot engine. He immediately began to put as much distance as possible between him and the plane, but he had not travelled far when he brought himself up short.

"The looey! I don't think he got out yet!"

He turned back toward the ship. Then, sick with horror, he stopped.

"My God!" he groaned. "She's burning up!"

Even as he looked, the flames about the ship increased in intensity. Fifty feet away from the plane he could feel the heat as they licked hungrily onward. Then he saw a movement beneath the plane. Lieutenant Dum!

The officer was absolutely helpless. Tangled up in the wreckage with the unwieldly bulk of his parachute pack hindering him, it looked as though Lieutenant Dum would be burned to death. Even his safety belt was twisted in such manner that it could not be reached.

Farley would have been justified in "taking distance" again. There wasn't a chance in the world of the officer gaining his freedom.

Farley started to run again. But he was not running *away* from the blazing mass. He was running toward it! Then Private Farley proved that Uncle Sam had adopted a *man* as a nephew when he accepted Farley as a soldier in the Army of the United States. Farley ran *toward* the flames, and right into the dangerous vicinity of the gasoline tanks.

The possibility of an explosion meant nothing to the soldier. Neither did the painful gash above his left eye, pouring a torrent of blood into his eyes and mouth. Neither did the numerous other cuts and bruises that had resulted from the crash. All that mattered was an attempt to free his pilot.

Farley took a deep breath. He closed his eyes to the flames above, pulled his cap down a little tighter, then started

A Facsimile of the Cheney Award, given each year for an outstanding act of bravery.

to crawl back underneath the mass of wreckage that he had left a few moments before.

The officer saw him coming—ceased his struggling for a moment:

"Get back, you fool. Gas tanks—go up any second. Never mind try—"

"Go to hell!" was Farley's most unmilitary retort. "Keep still and I'll get these straps loose."

With blazing fuel dripping down onto his face and clothing the heroic gunner wrestled with the restraining safety and parachute straps that held the officer captive. Even when the heavy bundle was broken loose the task was not yet finished. The cockpit was so twisted that it held the pilot's body almost as in a vise. Again and again the officer ordered Farley out of danger's way. Farley could have been court-martialed for the answers he gave but he struggled on, bending back the tough strips and girders that still pinned the lieutenant.

When the hindering obstacles were finally removed, the soldier yanked the two-hundred pound body of the Reserve officer through the opening, then dragged him out beneath the plane to safety.

They regained their feet together and both began to run. They were less than fifty feet away from the blazing pile when—

Whoom! A column of flame shot thirty feet into the air, and a shower of liquid flame rained about them. The tanks! Even as the two men ran, the wind pursued them, bearing stinging drops of fire upon her breath.

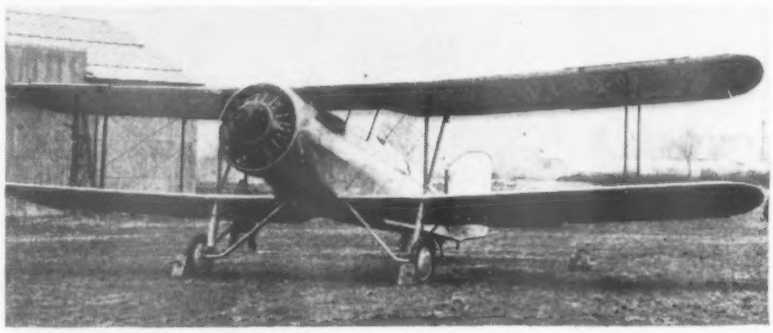
"I could never have broken free without Farley's aid. His quick thinking and speedy, fearless action is all that saved me from being charred to a cinder." Such was Lieutenant William Dum's official report of the rescue.

It was upon this report that a board of officers of the United States Army Air Corps, sitting in serious conference in the office of the Chief of the Air Corps at Washington, D. C., came to a momentous decision. Of all the heroic acts performed by members of the Army Air Corps during the calendar year of 1932, Private Farley's was the one which merited the Cheney Award, a memorial bestowed annually in recognition of "the outstanding act or acts of valor, self-sacrifice or extreme fortitude in a humanitarian interest in connection with flying."

The Cheney Award consists of a beautiful bronze plaque, a certificate which cites the deed for which given, and a substantial cash award. It was established by relatives of the late Lieutenant William H. Cheney, who served during the World War with the American Air Service in Italy. He was killed in an air collision at Foggia, Italy, January 20, 1918, and the award has been made annually since 1927.

Fire Eater Farley's receipt of the reward, strange to say, marks the fourth time that it has been bestowed for heroism in connection with a rescue from a burning ship or balloon. Six men have been presented with the Cheney Award since its inception.

Testing Planes for Mt. Everest Flight



This is the Houston-Westland plane especially developed for high altitude flying.

THIS photograph shows the Houston-Westland plane warming up for a test before the flight over Mt. Everest was attempted. This plane, which was built by the Westland Aircraft Works, is being piloted by Lord Clydesdale and is accompanied by Air Commander P. F. M. Fellows, the leader of the expedition.

Latest Beacons for Federal Airways

THE newest beacons for the Federal airways have been designed to take advantage of an optical phenomenon.

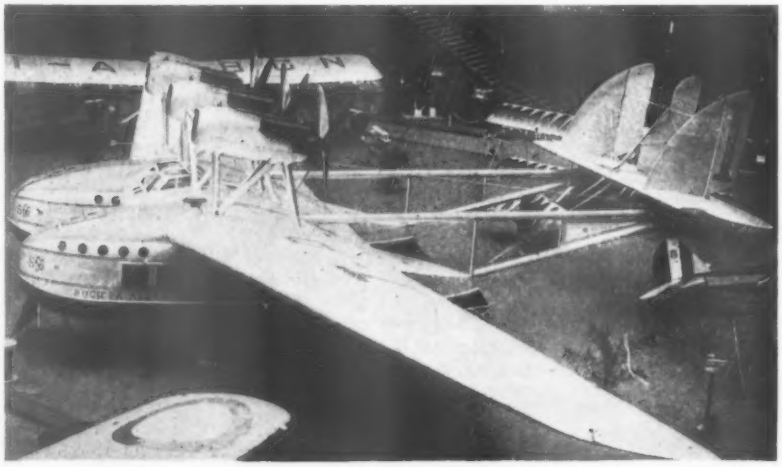
It is known that the outer portion of the eye, next to the retina, is more sensitive than that part of the pupil which transmits images to the optic nerve, thus accounting for things seen out of the "corner of the eye" that might pass unseen if they were looked at directly.

The new beacons make only three revolutions a minute instead of the customary six; thus each beam requires one-third of a second instead of one-sixth of a second to pass a given point and the effective visible range of the beacon is greatly increased. Now that the beacons have been slowed down, pilots say they can "feel the beam before they can see it." Literally this is untrue, of course — that sensitive part of the eye actually catches the beam and transmits the impression to the pilot before he actually knows he is seeing it.

Fifty of the new beacons have been installed by the Department of Commerce, and 200 more have been ordered from the manufacturer. To comply with the requirements of six flashes a second, the beacon lights are double-ended.

Italy's Latest Duplex Seaplane

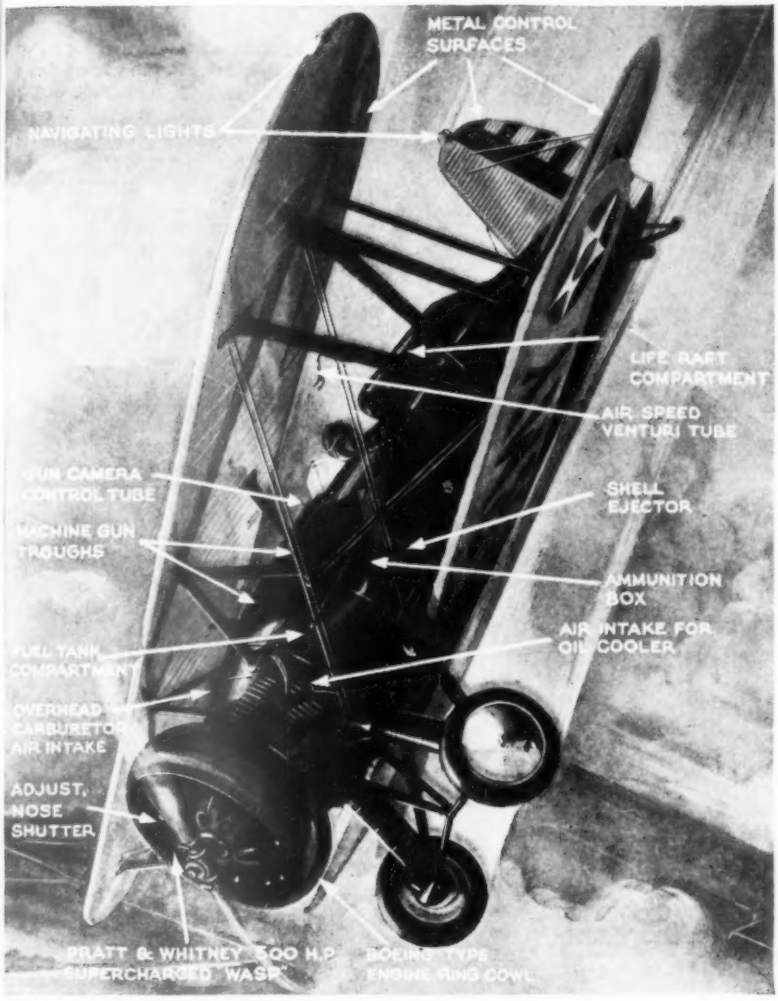
ONE of the sensations of the Paris Air Show was the tremendous double hull or "Duplex" flying boat built by the Marchetti Works in Italy. It is a pusher type provided with outriggers for carrying the tail group—much like the double hulled Bleriot. The pusher type seaplane is coming more into prominence every year.



Here is the Italian double-hulled flying boat that shows many new features.

Complete Details of the Boeing P-12E

An action picture and a three-view drawing shown herewith, completely describe the Boeing pursuit ship shown on the cover. Next month, the latest Vought Corsair will be featured similarly.



Showing the equipment carried by the Boeing P-12E

OUR readers have taken such an interest in the Boeing Pursuit plane, Type P-12E, its arrangement and its various component parts, that we are showing all of the details now permitted by the government.

In making up this chart, we were courteously assisted by the Boeing Airplane Company who supplied all of the necessary data for the action sketch and furnished the three-view dimensioned line drawings. This is the first time, we believe, that the purpose of many of the parts has been revealed to the general public.

It is said by authorities, by reason of its wonderful performance, astounding maneuverability and armament, that is far surpasses the best of European planes of its type. Unfortunately, at least for our readers, the exact and complete figures on its performance are withheld by the government for obvious reasons.

It represents a long period of development, and under different type designations is supplied both to the U. S. Army Air Corps and the U. S. Navy.

When used by the Army it is the "P-12E." When used by the Navy it is called the "F4B-3." The only difference between the Army and Navy ships, however, is the arresting gear for deck landings used with the navy planes and the different color schemes used by the two branches of the service.

Color Schemes

THE ARMY P-12E

KHAKI for fuselage, landing gear, struts and cowl. ALUMINUM wheels.

ARMY YELLOW for wings, fin, stabilizer and elevator. BLUE vertical stripe on rudder.

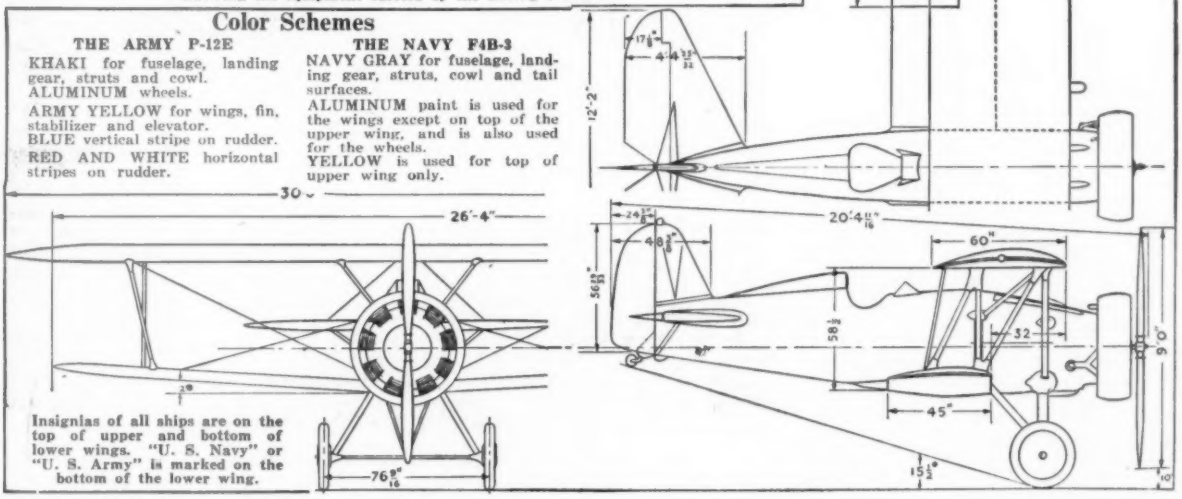
RED AND WHITE horizontal stripes on rudder.

THE NAVY F4B-3

NAVY GRAY for fuselage, landing gear, struts, cowl and tail surfaces.

ALUMINUM paint is used for the wings except on top of the upper wing, and is also used for the wheels.

YELLOW is used for top of upper wing only.



Insignias of all ships are on the top of upper and bottom of lower wings. "U. S. Navy" or "U. S. Army" is marked on the bottom of the lower wing.

P. A.'s Airplane Photo Contest

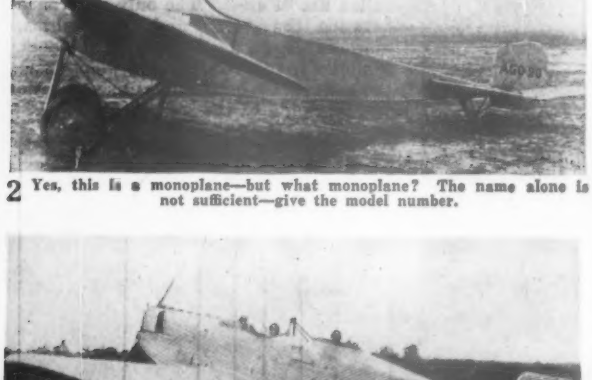
Here we have a contest devised particularly for the members of our Photo Phans Club who consider themselves foolproof.

1 This ship is a comparatively recent type. What is its name, the Model name or number, its purpose and its nationality?

THE rules for entering this contest are short and simple. You take a good sharp look at the photographs on this page, and then set the names down on a piece of paper in the proper order, numbering each answer. Then send it to us, Puzzle Editor, POPULAR AVIATION, 608 S. Dearborn St., Chicago, Ill. Don't tear this page out of your magazine—save it.

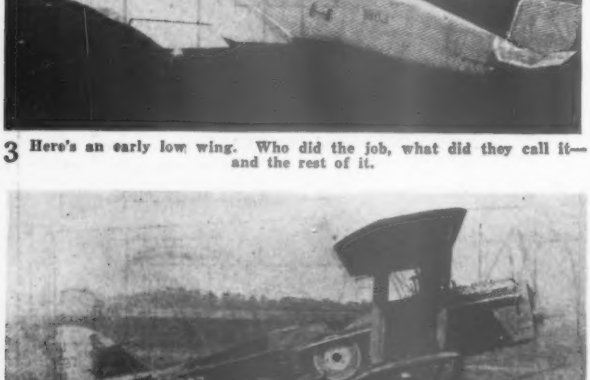
You may think that we have some trick stunt, that we have retouched or have changed the pictures in some way. Not a bit of it. The pictures are unaltered photographs and not retouched. You've seen them all, some place, but not these views.

Now as a reward for this great exertion, to the first ten readers who send in the correct names for the planes, we'll print the names in the following issue. That's all there is to it, except no "fair" referring to your albums.



2 Yes, this is a monoplane—but what monoplane? The name alone is not sufficient—give the model number.

5 Look at the smoke stack! Wonder who got this idea and what he named it?



3 Here's an early low wing. Who did the job, what did they call it—and the rest of it.

6 Yes, she's over on her back but this shouldn't stop you from naming her.

4 Nice looking side view of something. You surely shouldn't fall down on this one.

7 What a nice monoplane! If you use your eyes you should have no trouble at all with this one.

Latest Vacuplane Developments

by ALBERT FRENCH

This unusually compact machine has been under development for some time by its inventor, Mr. Lanier, and it has now arrived at the point where it can be called a practical flying airplane.

MORE than one year ago, we published a detailed account of the early experimental Vacuplane XL-111, a plane that stands unique among other types of aircraft.

And now we are pleased to describe the very latest Vacuplane which has been under almost continuous experiment and development since the publication of our first article. In numerous trials at the Boyers Airport, Ross, Ky., with Wendell Fleming as pilot, the Vacuplane has proved to be inherently stable, taking-off and landing very satisfactorily, besides being very fast in the air.

It is extremely compact, having a span of only 13′ 0″ and the almost unbelievably small area of 66 square feet lifting surface. Its appearance is different and pleasing, appearing much like a bird in flight and very radically different than the conventional airplane now commonly used.

While wings are used, the wing of the Vacuplane is basically different in principle and design than the standard airplane wing. Further, this original construction avoids the many factors of instability present in the conventional airplane wing so that it is easy to handle.

When the wing of the Vacuplane is cutting through the air, part of the air is deflected and thrown back by the leading edge, passing over the center cellule and the outer stub wings in a stream. This stream of air creates an area of low pressure into which the atmospheric pressure forces the plane upwardly, creating the equivalent of wing lift.

But, since all of the air is not deflected by the nose, and as it is this air that prevents the vacuum from being as low as it should be, means are provided for improving the vacuum by diverting this stray portion of the air stream. This result is attained by omitting the top surface covering of the center cellule with the exception of that portion of the surface that lies close to the leading edge of the cellule.

Front elevation of the Vacuplane showing the exceedingly short wings and compact structure. The main cell lies just behind the propeller.

This construction is shown clearly by the front view where the center cellule is the thick portion of the lifting surface having a sharp dihedral angle, while the wing stubs project out horizontally for a short distance on either side of the cellule. Vertical fins are installed at the tips of the wing stubs and also at the point where the cellule intersects the stubs.

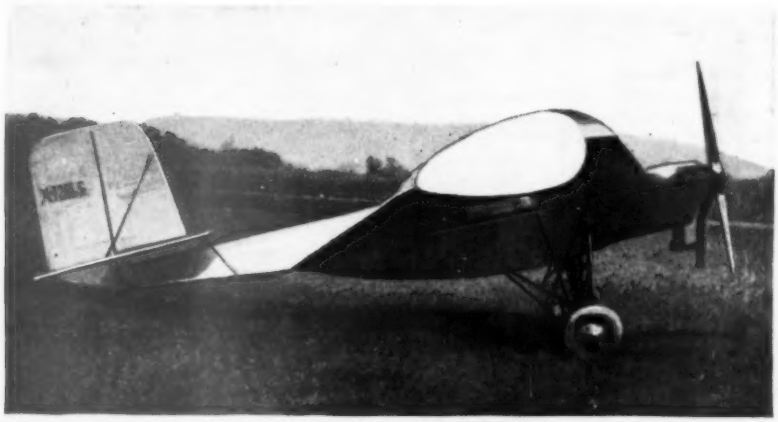
By omitting the top covering of the cellule, the stray air stream is syphoned off by the suction pressure and therefore does not enter into the hollow space of the cellule. This permits of a very good degree of vacuum and correspondingly improves the lifting effect of the surfaces.

It is obvious that the lifting effect of this surface is very much greater than with the usual form of airplane wing, and that the unit loading on the cellule is much higher than would be permissible with a plain airfoil. And again, there is practically no variation in the position of the center of pressure at extreme angles so that the ship is inherently or self-stable.

The compactness of the lifting surface and the fact that the effective surface is very close to the body, permits of great reductions in the weight of the ship as well as reductions in the cost of materials and labor. Light weight, below the limits of the ordinary airplane, is attained without sacrificing strength or other desirable qualities.

With the greater portion of the lift coming directly over the center of the load, or close to it, the heavy bending moments experienced with common airplane wings are avoided. This naturally means that there will be a lesser weight of material in the cell of the Vacuplane and that there will be an all around improvement in performance.

Compactness is always a virtue from any angle that you may look at the subject. Compactness solves the storage problem which is one of the great objections to the ordinary airplane, it reduces the weight, reduces the cost of operation and, in many ways, makes a greater appeal to the private owner.



The side elevation of the Vacuplane is not much of a departure from standard practice except for the thick wing fins which give an impression of great wing thickness.

Lightning Strikes an Airplane

Artificial lightning strikes a metal model airplane.

THE danger of lightning is an ever present possibility during the good old summer time but airline operators have regarded this hazard as one of minor importance—possibly because so few ships have actually been struck by lightning in actual service.

Believing that he could solve the lightning problem, A. O. Austin, internationally famous expert in high-tension electric current, has been conducting experiments at the "Lightning Farm," Barberton, Ohio, and he has obtained some remarkable data on the subject.

Artificial "lightning" is developed at the farm by huge step-up transformers, and in the illustration, a 27 foot bolt of synthetic lightning is striking the model of a plane. The path taken by the flash is clearly shown and exactly demonstrates just what would happen in case that a plane entered the stressed atmosphere under a thunder cloud.

Over in England, where several ships have been struck by lighning without damage, they guard against danger by thoroughly bonding all of the metal parts together so that the ship offers little resistance to the bolt in case that it should be struck as shown.

Picnicking by Air

SEEING the mountains and flying to picnic grounds with an airplane are proving sports for Pacific fans. Recently a party was flown to a picnic ground on the mountains to spend the day. The pilot was able to land his plane without difficulty in an open mountain park.

Later in the evening he returned, picked up his passengers and brought them down at the local airport. In this way hundreds of mountain beauty spots which have gone unenjoyed and unseen by the lovers of out doors can now be viewed by visitors. Picnicking by air is a late diversion but proving to be a popular one.

QUESTION AND ANSWER DEPARTMENT

Your questions are answered authoritatively by Popular Aviation's Staff of experts.

THIS department is open to all of our readers and we welcome your inquiries so long as they apply strictly to aviation. So send in your questions. This service is free to everyone, but please avoid personal matters or subjects that are not of general interest. And just as a particular favor to the editor, please *print* your name and address so that no mistake will be made in sending a reply. Every month we receive letters very indistinctly written, and sometimes the writer has omitted his name or address.

* * *

QUESTION:—J. K. B., Sioux City, Ia. (a) *What is meant by "presented area?"* (b) *What is an arc welded fuselage?*

Answer:—(a) THE presented area of a body is the frontal area of a surface that meets the air-stream at right angles to the stream. (b) The steel tubing of the fuselage is welded by an electric flame or "spark" taking place between a metal rod called an "electrode" and the joint being welded.

* * *

QUESTION:—F. S. D., Paris, Ill. *What is meant by "gyroscopic force" and how is this force applied to an airplane?*

Answer:—GYROSCOPIC forces, more properly "gyrostatic forces" are forces produced (reactions) when the plane of a rotating body is changed. The propeller of a ship resists changes made in its plane of rotation and these forces affect the control of the ship. Thus, when the ship is turned suddenly to the right, for example, a gyrostatic force is developed which tends to force down the nose of the ship.

* * *

QUESTION:—G. F. G., Louisville, Ky. (a) *Do the propellers cause any lift when the airstream passes over the wings?* (b) *Does a plane climb as fast at high altitudes as when near the ground?*

Answer:—(a) YES. The slipstream from the propellers does cause a certain amount of lift, and if propellers are arranged all along the length of the wing, the effect is very marked. (b) The rate of climb gradually falls off as the altitude is increased because the air is rarer and lighter. The distance above ground is not of importance—it is the height above sea-level that must be considered for the ground is at varying distances above sea-level.

* * *

QUESTION:—D. McM., Enid, Okla. *What is the difference between the angle of incidence and the angle of attack?*

Answer:—THE angle of incidence is a fixed angle between the chord of the wing and the center-line of thrust. The angle of attack is the angle made by the chord of the wing with the air-stream. The angle of attack varies with flight conditions.

Showing the arrangement of the wing slots and flaps on the Heinkel monoplane.

* * *

QUESTION:—S. S. McC., Atlanta, Ga. *How do rotary engines work, the Gnome and LaRhone, for example.*

Answer:—THE difference between a rotating cylinder engine and a radial engine is simply one of relativity, so to speak. In either engine, the crank moves in regard to the cylinders, or the cylinders move in regard to the cranks in the opposite direction. Therefore, it makes no difference whether the cylinders revolve with the cranks stationary, as in the rotary, or whether the cranks revolve with the cylinders stationary as with the radial.

The pistons reciprocate in regard to the cylinders in both types, but the pistons of a rotary run around the crankpin in a circular path and do not reciprocate in relation to the airplane.

* * *

QUESTION:—S. G. F., Mobile, Ala. *Does the shape of a wing affect its action, that is, the outline of the wing as seen by looking down on top of it? What effect has tapering the wing?*

Answer:—THE shape or "aspect" of a wing has a considerable effect upon its effectiveness. A long slender wing is more efficient than a short stubby wing. A wing with elliptical tips is more efficient than one with square cut ends. A tapering wing gives better results than a rectangular type and so on.

* * *

QUESTION:—A. D. L., Dixon, Ill. *Are the wing slots and flaps of the Heinkel ship interconnected?*

Answer:—YES. They are mechanically interconnected and act automatically so that they can operate without the pilot's attention. However, when desired, they can be locked rigidly.

The Caproni Flying Barrel

This is a unique type of monoplane with which the Caproni firm is experimenting in Italy. It is claimed to possess many excellent features in construction and performance.

ENGINEER STIPA of the Caproni Airplane Works, Italy, has introduced a decidedly different type of monoplane and it is said that the tests have proved it more efficient and stable than the more conventional type of ship.

The first experimental model was a two-seater type built for the purpose of checking up on the wind-tunnel determinations and it presents a most unusual appearance. Essentially it consists of a huge hollow barrel-like body to which the monoplane wings are attached on either side.

At the front end of the barrel cellule are the engine and propeller with the propeller diameter approximately the same as the diameter of the cellule. By means of the ribs forming the circumference of the cellule, the edges of the hollow cylinder are of streamline form instead of flat, hence the opening really forms a huge venturi tube which offers a minimum of resistance to the propeller slip-stream and the translational air-stream.

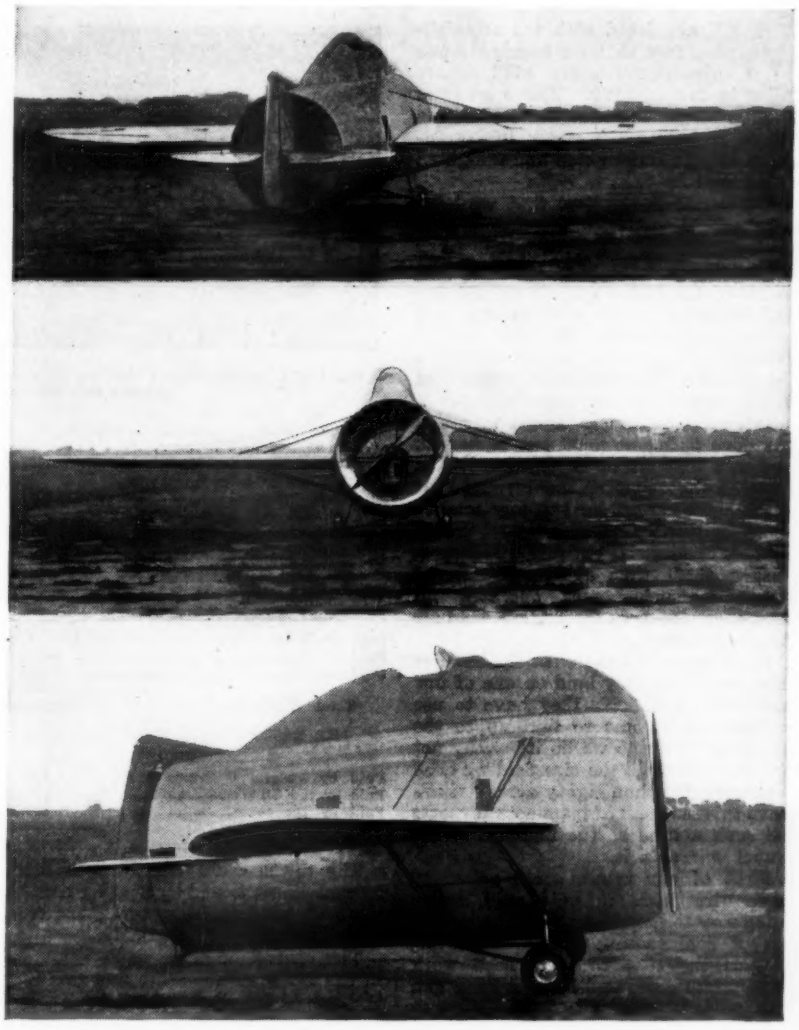
By this means, little of the propeller slip-stream strikes the main wings, but as the tail-group is placed cruciform across the rear end of the venturi passage, it receives practically all of the slip-stream plus the translational air-stream. The vertical surfaces, the fin and rudder, are acted on only by the interior-stream, but the horizontal elevator flaps and the horizontal stabilizer project somewhat out into the zone of the air-stream so that these surfaces are not entirely dependent upon air passing through the venturi section.

Above the drum cellule is the streamlined pilot's enclosure, uncomfortably high above the ground but with an excellent range of vision. The usual type of controls are employed which are claimed to be more easily handled than those on the more common type of plane.

Engineer Stipa claims a number of advantages for this design which seem to be verified by the tests. First, the action of the slip-stream on the more usual type of fuselage is eliminated, producing less resistance than the after-portions of the standard fuselage. Second, the tubular venturi type of body presents less resistance to translation than the ordinary fuselage. Because of the guiding venturi section, eddies and whorls that ordinarily exact a considerable toll of the energy supplied to the plane are avoided.

Stability and maneuverability are greatly improved for the reason that the tail surfaces receive a uniform flow of air all over their surfaces and are free from the "fuselage shadow" that obtains with standard planes. Because they are securely fastened to the cylinder, there is an entire absence of "tail-flutter" and the difficulties that always attend the vibration of the tail surfaces. This security of the tail-group is one of the great advantages of this type of construction, for the standard type of fuselage tapers down to the rear to such an extent that the surfaces have a very poor anchorage.

Stability is further enhanced by the fact that the tubular body exerts a considerable lifting effect within itself at all angles of incidence, hence the travel of the C. P. on the wings is compromised by an opposing or counteracting travel of the C. P. within the body.



Views of the Stipa-Caproni Flying Barrel. Above is the rear view showing the secure tail group construction. The center photo is a head-on view showing venturi passage. The lower view is a side elevation indicating the tremendous diameter of the body.

SPECIFICATIONS

Wing span	47 ft. 2½ in.
Length overall	19 ft. 5 in.
Height	9 ft. 11 in.
Area of wings	205 sq. ft.
Projected area of body	90 sq. ft.
Engine	120 h. p.

A proposed Stipa-Caproni ship of the transatlantic type employing seven barrel units arranged along the wings.

We Need More Airports

by RAY PAWLEY, JR.

America needs many more airports to take care of the present traffic. If air travel continues to grow, our present deficiency in available airports will constitute a real menace.

WE are faced with the astonishing fact that we have only one airport for every 1472 square miles in this country. That's an area slightly larger than the State of Rhode Island including the water in Narragansett Bay. Our lighted and unlighted fields total 2055.

Worse yet is the fact that we have only one lighted field for each 4303 square miles of national area. Our lighted fields total 703. How in the name of Confucius can flying develop satisfactorily with so few places to go?

The main reason for this underdevelopment seems to be contained in the idea that it's useless to try to hold flying operations on anything but a quarter-section ranch. This impression has done flying no good but rather an immense amount of harm, for it has fostered the belief among laymen that an airplane cannot land in any smaller space without almost suicidal risks. Such a belief is entirely erroneous. Just a short time ago, a bi-motored Keystone bomber was operated all afternoon from a forty acre field at Angola, Indiana.

Most flying is done with the smaller jobs and when they land on one of our moderate sized fields they have to use a half-tank of gas to taxi up to the hangars. Why do we do it? Why not be wise and build the size field we need —usually less than eighty acres? Let's leave this business of mammoth airports till such a time as the increase in air travel warrants it.

Most of our towns could afford to have nice fields if we'd only devise some way to help them with the expenses of constructing them. Moreover, now is the time to start such work with prices down and labor easy to get.

Here is a plan with estimates that will more than double our present total number of fields and will nearly quadruple the number of lighted fields.

UNLIGHTED FIELDS ESTIMATES

(1) The cost of the field—unlighted..$12,000.00
Made up of:
80 acres @ $40/acre.....$3200.00
Grading and scraping..... 2400.00
Hangars and Operation Office 4000.00
Miscellaneous 2400.00
(2) Total number of unlighted fields to be built.....500
(3) Total cost of 500 unlighted fields built $6,000,000.00

LIGHTED FIELD ESTIMATES

(4) The cost of one lighted field.....$20,000.00
Made up of:
80 acres @ $40/acre.....$3200
Grading and scraping..... 2400
Hangars and Operation Office 4000
Lighting Equipment 8000
Miscellaneous 2400
(5) Total number of lighted fields to be built 2000
(6) Total cost of lighted fields to be built $40,000,000.00
(7) Total cost of 2500 new airports 46,000,000.00
(8) Amount paid by Federal Government 23,000,000.00
(9) Amount paid by participating States 11,750,000.00
(10) Amount paid by participating towns 11,250,000.00

A model of a modern airport showing the paved runways and lighting arrangement. Such fields are not very expensive and are a necessity.

THE RATIO OF PAYMENT FOR A LIGHTED FIELD

Paid by Federal Government.....$10,000.00
Paid by State..... 5,000.00
Paid by town..... 5,000.00
Total Cost.....$20,000.00

THE RATIO OF PAYMENT FOR AN UNLIGHTED FIELD

Paid by Federal Government.....$ 6,000.00
Paid by the State..... 3,500.00
Paid by the town..... 2,500.00
Total cost.....$12,000.00

The towns could finance such fields by contributions and by floating a small issue of bonds, which, being tax-free, would be snapped up quickly.

The control of these fields would be in the hands of the state and this control would be administered by an airport committee in the town—the Chamber of Commerce, if one exists. They would be open to any and all flyers, though exclusive privileges for commercial rights could be granted.

This plan would be beneficial to the general public as well as aviation, for it would open up the "out-country" to flying services and will create jobs for managers and attendants. Men for the construction work should be employed locally as far as possible.

Aviation will be better off for the additional landings as well as for the increased demand for airport and airplane supplies. Many of these towns will rent the commercial privileges, and that should stimulate airplane sales. Even "goodwill" should be considered, for it is sure to result from so many people having aviation brought close to them where they can see its safety and value.

There is an important point to be considered in the location of these fields. The following system might be used with success. Take strip-maps of all the air routes in the country and locate the lighted airports along those routes and within ten miles either side of the direct route line. Any lighted fields remaining from the two thousand should then be located at random—with preference given to larger towns off regular air routes.

The 500 unlighted fields should be placed in such terrain as will seldom be flown at night. Moreover, these fields should not, in all fairness, be placed on air-routes, but rather in the outlying country.

There is the question of maintenance. The state could handle that rather well, with proportionate help from the town. The income of all such fields in the state, minus the expenses of all the fields, would pay for that. And any excess would be returned to the fields in proportion to their earnings. This must be done because it would materially damage the entire system if these fields were permitted to go out of business.

To return to see how this would affect that important ratio of square miles to airports, we find that with this plan carried out the following table becomes true.

Ratio	Present	New Plan
Square miles per field	1472	664.1
Square miles per lighted field	4303	1,119.1

This plan would cost the Federal Government 23 million dollars—about the cost of one battleship. How much better prepared we'd be with 2500 new flying fields and the activity they would stimulate than with one extra battleship that could be sunk easily by attacking airplanes.

This is a challenge to the Chambers of Commerce and Exchange Clubs in the various towns. See that *your* town is so equipped.

Progress Made in L. A. A. Drive

While applications for membership in the lightplane association have been coming in rapidly, yet we still have a long way to go before we finally reach the 500 members necessary for our charter.

WHILE it has only been a short time since the last issue reached our readers, at the time this is being written, yet the applications are coming in at a good clip, each with the one-buck money order attached for the dues.

Just at this minute, the prospects look fine, but time alone will tell whether this rate of enrollment will continue until we reach the required 500 mark set for the minimum membership.

The letters are also encouraging, for all of the new members are enthusiastic over the idea of the lightplane club and many have appointed to themselves the duties of a membership committee for getting new members in their own vicinity. Mighty fine, fellows. We appreciate it and the association appreciates it.

In due time we will get out the membership cards which will be mailed to paid-up members in good standing, but we can't print these cards until we have a name for the shebang! That's the obstacle at the present time.

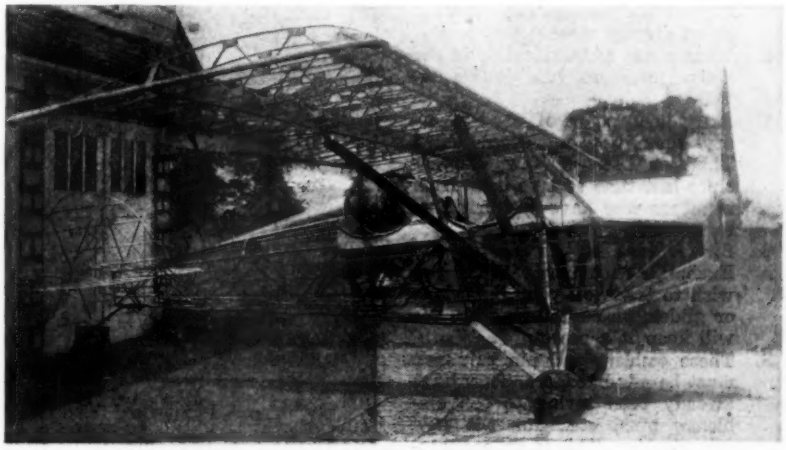
Maybe, just to push things along, we had better name it (temporarily) The Lightplane Association of America. Then, if you fellows want to change the name afterwards when the club is organized, you can do that without much trouble.

We haven't taken the burden of naming the club upon our own shoulders—we're not presumptuous enough to do that—but we've got to have some sort of a name to start the ball rolling.

Then, very much to our surprise and gratification, a lot of the fellows wrote in and expressed their intention of coming to Chicago this summer and of attending the lightplane convention which we have proposed from time to time. This *is* great.

We're very much afraid, however, that the depression is going to cost us some very valuable members because a lot of the fellows have been out of work so long that a dollar bill looks pretty big to them. Just how to get out of this dilemma is a problem, because if we do let them in without payment it would not be fair to the other fellows who were able to kick in. On the other hand, we wish to avoid an obstacle whereby the lack of a buck will cost us a good earnest hard working member. What to do?

And so, doping around for a while, we have arrived at this idea. Let these fellows who haven't got the cash, work out their dues by getting us new members! For example, if any lightplane fan sends us three new members, together with the three bucks for their dues, then he gets his membership free



Here's Mr. Bell's ship which is being held up until he can get some one to run a stress analysis for him. Amateur ships, just like this one, are being held up all over the country by silly laws.

What about that scheme? Well, fellows, try it for a month, anyway, and we'll see how it works out.

Looking over the letters brought to light a very peculiar fact. That is, there are a lot of red-blooded citizens who have paid their dues and do not own a lightplane nor have they any immediate intention of owning a plane. In other words, they are associate members who are joining just for the sake of supporting a worthy movement!

And this leads us directly to the second amazing discovery. Where are some of you fellows who will benefit directly from the activities of this organization and who have as yet failed to make an application? That's what we'd like to know.

From first to last, we have had about 500 indignant letters from Howlers. Even now we are receiving howls and wise advice from orators who gracefully overlook the requirements for membership. And then there's one bird who thinks that he and his brother should be admitted free because their uncle is a state representative! Well, it might be a good bargain at that if we knew whether they were on good speaking terms with their mother's brother. Les Long is the chairman so he'll have to investigate this case. Let the joy be his.

You may think that we're passing the hat with a vengeance so far in this article, but money is an essential factor just now. We still maintain our stand that if there are not 500 lightplaneers who are willing to let go of a dollar for this purpose, then we might just as well turn this Howl Department into a kiddie-car section. We pass the hat but not the buck. How's that?

Well, getting back to normalacy, we have a lot of other business to take up. And here are listed as many problems as we have room for in this issue.

1. What are we going to call this organization- Give us some short comprehensive names that will cover the purpose of the association.
2. Do owners of planes over 50 h.p. become active members or associate members?
3. What about the membership of

POPULAR AVIATION,
608 S. Dearborn St.,
Chicago, Ill.

Gentlemen:

I enclose one dollar ($1.00) herewith for one year's membership dues in the lightplane association now being organized.

NAME.....

STREET OR R. F. D.....

CITY.....STATE.....

XUM

politicians? There are two on the waiting list now, but do we want them?

4. And then there are two girls, each with a dollar bill in her hand, who are waiting eagerly for admission. Do they become members or is it thumbs down?
5. Are flying instructors in schools eligible for membership? What about airport mechs?
6. What about a classification of the active members into grades A-B-C-D?
7. Are you in favor of the temporary committee as listed here? There've been a few changes since last time so let's hear from members who have any criticism to make on our selection.
8. Special note to our Barter and Exchange customers. When you wish to trade off your lightplane or glider, please tell us why. We will keep it a secret.
9. These emblem and pin salesmen must be mind readers. They have already been trying to sell emblems, pins, etc., for the new organization. This is an opportunity for our artistic members to design a pin, but for the love of Mike, leave out the wings and the prop.

Stanley Rowan, one of our most enthusiastic members, was at the office the other day and told us of his almost unbelievable struggles in building a lightplane. This incident shows just how far a fan will carry the object of his enthusiasm.

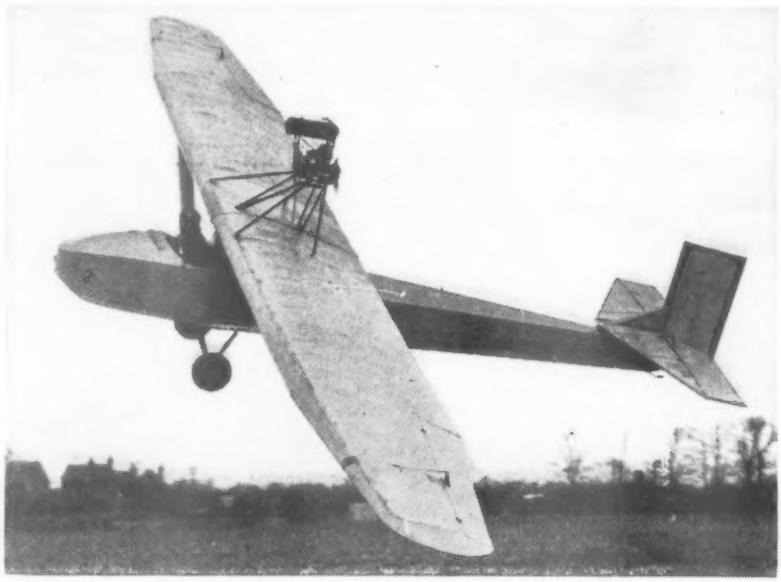
Mr. Rowan is boarding in Chicago where there are no special facilities for building lightplanes and, believe it or not, he has built a whole Heath Parasol in his bedroom! He tells us that he is mighty anxious to see the Illinois gag law put out of business, probably so that he can get the ship out of his boudoir and have more room to sleep in.

Well, fellows, by the time that the next issue goes to press we'll have a better idea of how this organization is going over. Hope we'll have our quota by that time.

L. A. A. Committee

Leslie Long, Cornelius, Ore., Chairman.
B. H. Pietenpol, Spring Valley, Minn.
Manley Mills, Royston, Ga.
O. G. Corben, Madison, Wis.
F. Nagle, Saugus, Mass.
Walter R. Franklin, Kankakee, Ill.
William L. Hopson, Oro Grande, Calif.
Carl B. Ogilvie, Freehold, N. J.
V. W. Payne, La Grange, Ill.
Louis W. Fiedeldey, Park Ridge, New Jersey.
Lawrence Lesh, Chicago, Ill.
J. Church, Chicago, Ill.
T. E. Mead, Chicago, Ill.
Vernon Sahlin, Chicago, Ill.

British Powered Gliders are Interesting



The British powered glider in flight. Note the position of the engine and pusher propeller above the wing of the plane and the excellent vision afforded the pilot.

THIS is the British B. A. C. No. 7 powered glider which has attracted considerable attention in England. It was tested out at Hanworth Aerodrome, Middlesex, England, by special permission of the Air ministry. (This sounds just like home.)

This powered glider was built by Lowe Wylde, one of England's pioneer glider experts, and is equipped with a six horsepower engine installed above the wing. This is an interesting experiment and American glider fans will be interested in learning how the trials came out.

Without actually trying out these small ships it would seem that they would have very little power reserve, and power reserve is one of the great factors in safe flying.

Coast Guard Gets New Ships

The Coast Guard Amphibian taking off the water.

WHILE people living inland seldom hear of the aeronautical activities of the U. S. Coast Guard Service, yet this department of the Government is airminded to the nth degree.

They have a varied duty ranging from making rescues at sea, chasing rum-runners and smugglers and doing a general all 'round marine police service. They fly in all weathers and under the most hazardous conditions to perform their work.

Therefore, the new fast and seaworthy amphibian that has been delivered to them is of particular interest.

How to Build the Corben Junior Ace

by O. G. CORBEN

PART I

This is the first article of a complete series of construction articles showing all of the details of a popular convertible type lightplane that has shown excellent performance. Two pages of detailed blueprints will appear in the next issue.

Introduction

THE Corben Junior Ace is one of the finest sportplanes built in this country. It is a two-place monoplane of unusual design.

Aside from its remarkable stability and performance it has the outstanding feature of being readily converted from an open-cockpit to a complete cabin design within a few minutes by the changing of turtle decks and windshields, thus permitting the comforts and advantages of two designs with one ship.

The Junior Ace was designed by Mr. Corben of the Corben Sportplane Company of Madison, Wisconsin. Mr. Corben also designed the Baby Ace single-place sportplane which was one of the first lightplanes built in production in this country.

Several different power plants may be used for the ship is designed and stressed to accommodate any engine from 35 to 50 horsepower. As there are used lightplane motors in great numbers now on the market at very reasonable prices, this together with the low cost of materials used in the Junior Ace, will produce a reliable plane of dependable performance for approximately $500.00 including power plant.

For those who do not care to build the plane from raw materials alone, semi-factory built parts and units which require only assembling can be obtained.

The accompanying photographs will give you a clear idea of the graceful lines and appearance of this trim sportplane with specifications as follows:

SPECIFICATIONS

Wing Span	34 ft.
Height	6 ft., 6 in.
Length over all	20 ft.
Weight, empty (Salmson engine)	550 lbs.
High Speed	95 M.P.H.
Landing Speed	28 M.P.H.
Service Ceiling	15,000 ft.
Cruising Speed	75 M.P.H.
Cruising Range	300 Miles
Gasoline Consumption	3 Gal. per Hour.

A three-quarters view of the Corben Junior Ace with the full vision cabin in place. It is now a cabin ship giving full protection to its occupants.

The fuselage, tail-unit and landing-gear of the Junior Ace are built of steel tubing. The wings are the usual wood and fabric construction. The shock struts on the landing gear are of original design. The entire plane is of proven but simple construction and can be built by the average young man within a few month's time. Only a few tools are required of the type found in nearly every work-shop with the exception of a welding outfit. If semi-factory built parts are used there is no welding to be done by the builder.

Next to the simplicity of this sportplane, its low operating cost should be considered as it is possible to fly the Junior Ace at less expense than you can drive a light car. Actual tests have shown that the gasoline consumption is less than three gallons per hour at a cruising speed of 75 miles per hour.

The author has agreed that if any one who starts to build the Junior Ace from these plans should run into any difficulty that he will be only too glad to answer letters or help solve any problems.

---

by O. G. CORBEN

BEFORE we actually go into the details of building the Corben Junior Ace it might be well to bring out a few interesting and important facts.

First: it has come to my attention that some of our home-builders are discouraged by pilots and others when they mention building a plane at home. It is true that several home-built planes have never left good old Mother Earth, and perhaps it was a very good thing they did not. I know that to be true of some that I have seen, on the other hand I have seen and flew several home-built planes that would compare with any factory built ship both in appearance and performance.

After talking to some of these pilots who knock home-built sportplanes, I have found that they don't know anything about lightplanes and the thought of flying without a lot of horsepower just does not appeal to them. They don't stop to consider that everyone cannot afford the first cost nor the upkeep of high-powered planes.

Why not choose the power plant and then build the plane to fit? In Europe, where gasoline is at a premium, they have done that very thing with amazing results and planes have been flown with as little as seven horsepower. The Junior Ace was designed to give unusual performance with less horsepower yet have all of the flying characteristics of higher power planes. The very first test flights proved beyond a doubt that our efforts were not in vain.

(*Continued on page* 260)

This is the same Corben Junior Ace with the windshield and turtle deck removed. It is now an open-cockpit plane when an O. C. is desired. This conversion is easily and quickly made.

A Plane With a "Gear Shift"

LEFT. A view of the variable speed ship and the release surface (in white) that varies the effective area.

BELOW. The pilot handles the variable surface with the lever at his left.

AFTER a considerable period of experimentation, a variable area plane has had successful trials in Germany. By varying the lifting effect by means of an auxiliary surface over the top of the wing, a very considerable speed range is had.

When high speed is desired, and at the time when the normal lift of the wings must be decreased in order to maintain horizontal flight, the upper false surface allows air to escape at the rear of the wing. At low speeds, when all of the lift possible must be exacted from the wings, then the top surface closes tight.

This is a considerable departure from the older variable camber idea, and is preferable to the variable camber stunt in at least one particular. The rigid wing structure is maintained which is not possible with the variable camber arrangement.

Operating a plane equipped with a variable speed device is similar to shifting gears on an automobile. A lever at the pilot's left hand varies the speed range just like the gear shift while the actual speed is controlled by the throttle within the speed range determined by the range controls. It is operated once at take-off, then adjusted to speed flight and then readjusted for landing.

Monoxide Gas May Prove a Menace

IS THERE danger of carbon monoxide gas poisoning in airplanes? Dr. Joel J. White, a lieutenant commander in the Naval Medical Corps, has been studying the question and he has uncovered some surprising facts.

In the first place, Dr. White found, there is a very real danger if the exhaust stack of a plane is faulty. Otherwise the situation need cause little worry. Dr. White rode in many Navy planes and several commercial transport ships, and he found traces of the gas in some of the planes, but in no case enough to represent any dangerous condition, although the quantity might have been sufficient to cause headache or contribute to airsickness.

The attention of the Navy was brought to the matter by the finding of carbon monoxide in the blood of Capt. Arthur H. Page, Marine Corps, after his fatal crash in the National Air Races in 1930. This led to the study now being made by Dr. White, a study which has taken him up 20,000 feet in Navy planes, has led to the detection of gas in the whorls of air just at the pilot's breathing level — even in open cockpits at high speed — and has led to the elimination of the causes of this condition by changes in the exhaust stacks of the motors and other modifications.

A warning machine has been developed by the Navy, and two of these are installed on the airship Akron. Also, when the Navy buys an airplane now, one of the requirements which the manufacturer must meet is that it shall be carbon monoxide free.

Another source of carbon monoxide, especially in closed transport ships is in the exhaust gas heating apparatus. This heating directly with the exhaust is a dangerous proposition as has already been pointed out in POPULAR AVIATION and has resulted in a number of casualties.

Exhaust pipes oxidize and gradually deteriorate in other ways so that an old exhaust pipe will often open up along a weld or will crumble, thus allowing the gas to enter the cabins.

Synchronizing Engines

BECAUSE an airplane pilot was observant, riding in transport planes is going to be easier on passengers and the wear and tear on the planes' engines will be greatly reduced in the future.

The pilot, George Kraigher, Western division of Pan-American Airways, was watching a big transport being "revved up" when the thought struck him that a way might be evolved to bring about better synchronization of the motors to eliminate the "beat note" and the consequent vibration which follows imperfect synchronization of three-engined planes.

So Kraigher put convex mirrors in the pilot's compartment, thus making the shadows of the whirling propellers visible. This made it possible for the motors to be "tuned" visually by the pilot and thus cut down errors to only eight revolutions a minute as against a variation of 50 when the tachometers were used alone.

Physical Examinations by the Thousands

MEDICAL examiners of the Aeronautics Branch have conducted 164,967 physical examinations of applicants for student permits and licensed pilots up to last advice from the Department.

A check of the records showed that the number examined each year since this work was undertaken was as follows: 1927, 4,325; 1928, 20,172; 1929, 38,982; 1930, 38,301; 1931, 38,774; 1932 (through month of August), 24,413.

The greatest number of reports from medical examiners submitted in any one year was 38,982 in 1929, although 1931 was a close second with 38,774. The month of August generally has been a leading one with respect to number of medical examinations conducted. In August, 1929, the examinations submitted numbered 5,557; in August, 1930, 4,408; in August, 1931, 4,061; and in August, 1932, 3,784.

The number of designated medical examiners now is 816. These physicians are locted at 471 places, including a few outside of the 48 states. Among the latter are one unit in the Canal Zone, one in Central America, one in Cuba, one in Haiti, seven in South America, one in Mexico City, six in Alaska, one in the Territory of Hawaii and one in the Philippine Islands.

These medical examiners are practicing physicians especially qualified in aviation medicine who have been designated to conduct examinations of student and licensed pilots by the Aeronautics Branch. They do not receive salaries from the Federal Government but conduct the examinations upon a fee basis, the fees being paid by the applicants for student permits or licenses, or renewals of licenses.

Welding and Brazing Methods

by LESLIE LONG

So much depends upon the security of joints and connections that particular attention should be paid to this part of the job as outlined by the author.

WHEN the amateur builder starts the actual construction of his long-planned design, he at once begins meeting difficulties, and one of the most serious of these is the problem of joints.

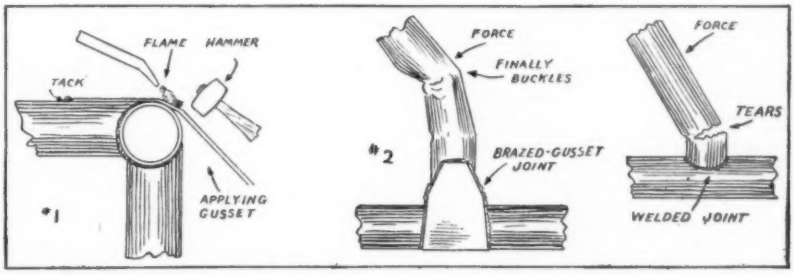
In the structure of an airplane, where the ratio of strength to weight is so vital, the methods used to join the large number of members together may easily mean the difference between success and failure. No such structure is stronger than its weakest joint, and it is a fact that most structural failures are in reality joint failures.

During the past few years, standard American practice has been to use wood in building wings, and steel tubing for fuselage construction. In more than 90 per cent of the planes, the steel tubing has been joined by acetylene torch welding. It is only natural, therefore, that the amateur should want to use these methods. He knows that the tubing has the necessary strength-weight ratio and that welding has proven itself satisfactory.

The amateur builder, however, quickly finds that welding is not suited to his purpose for at least two good reasons. The first of these is that good airplane welding is an art, requiring much skill and practice. The hiring of an experienced welder is a serious expense. The second and more important reason is that welding is not really suitable to his needs.

Much of the tubing used in the true lightplane may be of such light gage that it is not suitable for welding. It is a generally accepted rule that welding should not be used on tubing with a wall thinner than .035 inch, commonly called 20 gage. In the lightplane there are many places where tubing of .028 inch, or even thinner walls, may be used providing its strength has not been reduced.

When tubing is welded there is a certain amount of the metal burned away, and the heat is so great that it totally destroys the special quality of the steel, leaving it practically nothing but wrought iron. This is not so serious on heavy stock, but is ruinous to very thin sections. This is the factor that makes welding impractical in lightplane building.



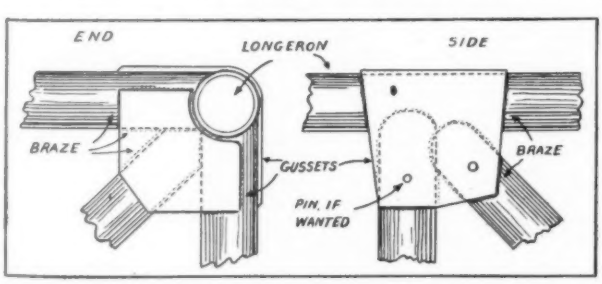
(1) Method of applying the strip or gusset by heating. (2) The well brazed joint seldom breaks, failure being due to buckling. (3) A welded joint may break as shown.

When we began the building of experimental lightplanes a few years ago, we at once ran into this trouble. Considerable time was spent in trying to work out a method that was not destructive to the light tubing, but results were poor. Not liking the idea of bolts and rivets, which make the construction both costly and heavy, we turned to brazing. This turned out to be the most successful method we have ever seen.

Brazing has a great many advantages. It is done at a temperature of around 1500 degrees, which does not injure the strength of good tubing. Bronze has the desirable feature of flowing into cracks and angles much like solder, something that welding can not accomplish. The best feature for the amateur is that no skill is required.

The tubing is heated to a dull cherry red and the bronze is flowed smoothly into and around the joint. If necesary, it may be reheated and a member removed or another added with no harm done. This is impossible with steel welding.

Bronze has less than half the tensile strength of steel and is NOT suited to plain butt welds. It must always be used in shear. For this reason the majority of the joints will be of the gussetted type, and it is this type of joint we are trying to feature in this article. The sketches are entirely self explanatory and there is nothing particularly new about them. The principal thing is to see that every joint is a shear joint. Where practical, make it a double shear joint.



Showing methods of brazing different types of joints. These joints are secure against fracture.

Use a good grade of bronze rod, with a rather low melting point. Always bring the work up to a dull red before applying the rod. Get a grade of flux that will allow the bronze to flow easily. When the work is heated, hold the rod in the flame a moment, dip it in the can of flux and then proceed with the brazing. Dip up more flux from time to time as plenty of flux should be used.

In building a fuselage, for instance, all members should be cut and fitted in the usual way and simply tack brazed as you go along. When it has taken shape, all the joints for members in place, may be finished up. The gussets are cut as needed. For most of the work, heavy tin snips are all that are needed. Always use gussets with a thickness as great as that of the thickest walled tubing in the joint. It will often save time and material to make a paper pattern that fits the joint and cut the sheet to this.

In applying the gusset, lay one tip of the gusset on a member and tack braze it there. Then, with a light flat faced hammer, tap it around the joint, applying heat to it all the while. When heated it bends like lead and makes a beautiful, smooth job. Continue with the brazing till every member is attached to its neighbor and to the gusset.

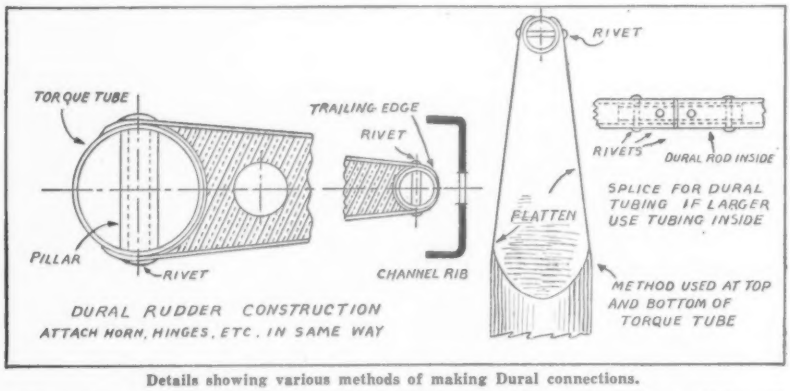
In some cases, it is a good idea to put a pin through gusset and tube. This may be a piece of steel wire or even a small nail. If used, braze over both ends to prevent it ever working loose.

These joints are absolutely indestructible. In five years use of them we have never known one to fail in any kind of crash. In all cases they are far stronger than the tubing, and the tubing itself is just as strong as before use. We had an expert welder here from one of the largest plane factories in the world and he could not make a welded joint that would compare with these at all.

His welds would always fail just

outside the joint, the steel simply tearing off, showing that the tubing had far less than its original strength. With the bronze joint it was impossible to do this. Final failure was simply a buckling of one of the members at any chance spot and the power required to do this was the same as on untouched tubing. In no case did the joint show any sign of strain.

While steel is still the main standby, there is a tendency to use Dural in some places. It makes a very light and strong job on such parts as rudders and elevators. Unfortunately, Dural can not be brazed nor welded. In our work we have been using the scheme shown. In the torque tube of a rudder, for instance, short lengths of small, heavy wall tubing are placed inside the tubing, using a long stick with a split end.



Details showing various methods of making Dural connections.

The only possible objection to this practice is the extra weight of the gussets. This might amount to two or three pounds on a fuselage, but it certainly is justified. There are many places where the design permits tubing that is quite light, but which would be useless if welding were used.

In other places, a large tube with thin walls is needed and it is perfectly safe if used this way. This is the case in elevator and rudder torque tubes. Gentlemen, you may proceed with perfect assurance that if you use this joint your ship is not going to fail you because of pulled welds, and you can have the satisfaction of knowing you can do it yourself as well as the most experienced welder can.

The rivet or bolt is passed through the rib butt, down through the pillar and safetied on the other side. Where the rib joins the trailing edge it is secured with a bronze rivet, care being taken not to crush the tubing. Rivets and bolts should be dipped in linseed oil before using to prevent corrosion.

This makes a very neat job, but is rather tedious and costly. In any case, the two methods should just about settle the hardest problem the amateur has had to contend with.

It is just by the careful observance of constructional details, such as these, that we can make dependable ships.

Galoshes and Skiis For Airplanes

HERE we see a U. S. Army Air Corps airplane fitted with skiis instead of the more conventional wheels for winter flying and landing. This is the perfected winter purpose plane of which mention was made in a previous issue of POPULAR AVIATION. It may seem like a simple thing to replace the landing wheels with skiis or runners, but experience shows that a great deal of experimental work is necessary before such landing gear is perfected.

U. S. Army Air Corps Photo

Here she is, all dolled up for winter.

Are Rotary Engines Coming Back?

ONCE in a while, airplane constructional details originated by early pioneers, but since falling into disuse, are revived and we find that they may have real merit.

The tail-wheel, for example, now found on practically all transport planes was used by Bleriot as early as 1909. Again, the tail-first plane is staging a "come-back" in Germany and in some respects seems to have greater stability than the tractor type.

Likewise the rotary cylinder engine, now extinct but popular before the World War, had together with its faults, many good points not usually found in the lightplane engine of today. Its shortcomings, by the way, consisted mainly of oil-slinging tendencies, faulty ignition and gyrostatic forces that affected the control of the plane.

Thanks to present-day knowledge of engine design, it seems quite possible to build a rotary cylinder engine in the lightplane class, eliminating the inherent faults of this type, yet retaining its desirable features.

In a stationary or industrial engine, vibration is not so important because rigid bases and foundations are easily provided. But in lightplane engine design vibration becomes a serious problem, for a small plane is certainly not a stable foundation for a power-plant. In a lightplane engine, vibration must be reduced to a minimum, or else serious results are apt to follow, such as structural failure caused by crystallization of the metal parts.

And this job of reducing vibration is a tough one with stationary cylinders on account of the light weight of the engine and the small number of cylinders. The pistons of a rotary reciprocate only in respect to the cylinders but actually are rotating masses in respect to the airplane structure.

In the case of the conventional airplane engine, the propeller is depended upon to act as a flywheel, which smooths out the power impulses. A lightplane engine, with only two, three or four cylinders, doesn't have an even flow of power, but imparts a jerking motion to the propeller at each power stroke. The small light propeller is seldom heavy enough to equalize and smooth out this intermittent delivery of power, and as a result, it is often weakened by the stresses thus imposed.

In the same manner, the hub-bolt holes may become worn with consequent loosening of the propeller. In such case, the value of a flywheel is obvious. It permits greater flexibility under load, besides absorbing the intermittent bursts of energy at each power stroke. On the conventional lightplane engine, the flywheel weight would be prohibitive, but this would not be so with the

(*Concluded on page* 260)

What Our Readers Are Building

A department devoted to our readers' activities in airplane, glider and engine construction, showing the latest developments.

Oregon Lightplane Association Dope

WE HAVE a pleasant letter from Herbert F. Orton, Vice-President of the Oregon Lightplane Association, 8105-56th Ave., S. E., Portland, Oregon, in which he gives us information about the club which was formed about six months ago.

They have about 25 members with three ships in the air at the present time and there are five more ships under construction. This is sure a fine start for a club, 'way better than the average club that we have contacted. We hope that he sends us some more dope and pictures of the ships.

The lightplane built by Mr. Orton and his partner, Mr. Frank A. Yokell, has flown about 20 hours and while not very fast, it is a very stable flyer—and that's better than a whole lot of speed. Its top speed is about 50 m.p.h. with a landing speed of from 20 to 25 m.p.h. The following table gives the rest of the data.

SPECIFICATIONS

Span	37'-0"
Chord	5'-0"
Wing Section	Gott. 430
Power Plant	Long 2-cyl. engine

We hope that this club will assist us in combating legislation, even though they do not seem to be having any trouble in Oregon. We envy those who can do as they please while we are bound down tight to earth here in Illinois.

The idea has just come to us that all of us might advantage if our proposed lightplane association became affiliated with some of the state clubs such as the Oregon Lightplane Club.

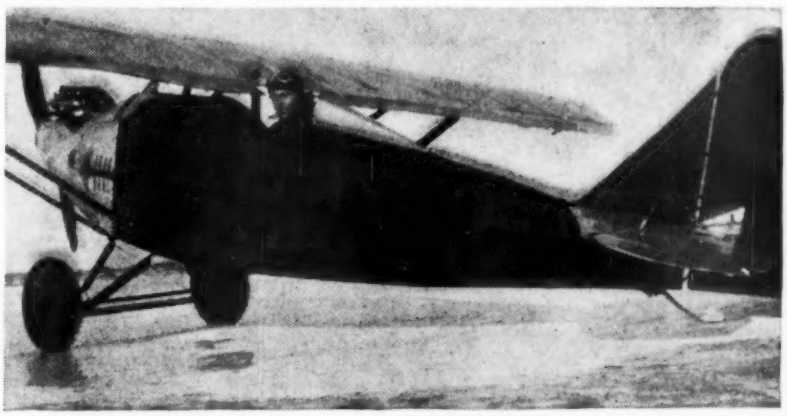
About the Mead "Ki-yak"

GLIDER builders will no doubt be interested in a new product now being made by Mead Gliders, Chicago. This is a modern adaption of the Eskimo "Kiyak," a little boat that is remarkably graceful and easy to handle, both on the land and in the water.

It is made in two models, a single-seater 10'-4" long and a two-passenger type carrying a gross load of 500 pounds which has a length of 14'-0". The small Ki-yak weighs only 18 pounds while the larger model weighs 35 pounds net.

They can be had factory built or in the kit form at a very reasonable price. The Ki-yak is said to excel the canoe in almost every respect. It requires less depth of water than a canoe and can out ride it in a rough sea. A sealed float chamber renders it non-sinkable.

Canadian Lightplanes Have Liberty



A closeup view of the Canadian plane owned by Ernest J. Rousseau. It is too bad that conditions are not as favorable here as in Canada for lightplaning.

WE HAVE received a very interesting letter from Ernest J. Rousseau, Callander, Ontario, Canada, in which he draws a graphic parallel between the laws governing amateur aviation in Canada and the United States. This is what he has to say:

"Since I am not a resident of the United States I have no reason to register a kick against the legislation that is making it such a rough and stony road for the amateur builders (bless 'em) but you can be sure that my sympathies are with these little fellows who have enough enterprise and ambition to "build their own" and fly'em too.

A side elevation of Mr. Rousseau's little ship which shows very clean lines.

"The Department of National Defense at Ottawa is certainly using us lightplane bugs throughout the Dominion in a reasonable manner. The inspector from the Department gives an amateur job a thorough inspection before registration markings are granted. Stipulations are made as to equipment required, instruments necessary to permit flight in safety, and proper rigging, mounting and adjusting of the entire structure.

"A plane built and flown for strictly private use does not require an air-worthy certificate but is granted registration, and if flown by a pilot holding a private license, at least, may be flown anywhere in the Dominion. I think this a large enough territory to satisfy most lightplane fans.

"I am enclosing, herewith, a few shots of my Russell monoplane, constructed by myself during my spare time the last two years. It has a span of 27 feet, length 16'-4" and weighs 345 pounds empty. It is powered with a Sensenick version of the 'lil ol' Henderson. Propeller by the same people.

From the photographs, the Rousseau ship appears to be a mighty nice job that is designed along the lines that we favor. Of course, the true proof of any plane is its flying ability, but just the same we are struck with the fuselage outline, the relation of the wing to the body and many similar details.

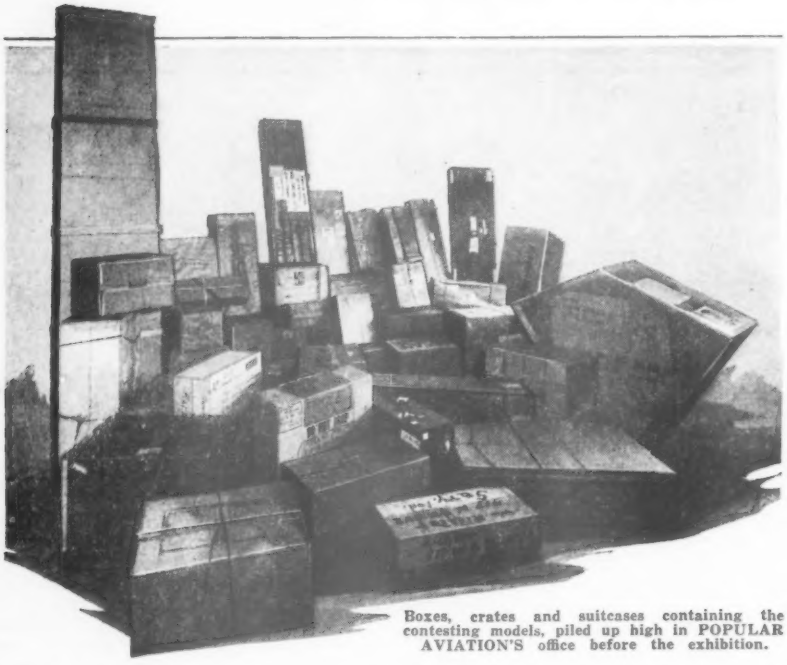
One of the most interesting points of Mr. Rosseau's letter, aside from the mechanical features of the plane, is that part that comments upon the leniency of the Canadian government in respect to the amateur. To be able to fly from one end of the Dominion to the other, without the interference of intervening states or provinces, is indeed of wonderful assistance to amateur aviation.

And again, the statement, "A plane built and flown for strictly private use does not require an air-worthy certificate," is music to our ears. They do not call for about a thousand dollars worth of stress analysis nor for a lot of other foolishness when the ship is used for private or experimental purpose. And I can see right here that aviation progress in Canada will be about ten times as rapid as it will be in the U. S. A.

XUM

Prize Winners in P.A. Model Contest

Names of the winners and the dope on the winnning models in one of the greatest model contests and exhibitions ever held in this country.



Boxes, crates and suitcases containing the contesting models, piled up high in POPULAR AVIATION'S office before the exhibition.

OUR First Annual International Airplane Model Contest is now a thing of the past and what a contest it turned out to be! Undoubtedly, the contest and exhibition embraced the finest and most comprehensive collection of airplane models that were ever assembled at one time.

Specimen after specimen of perfect workmanship and construction was submitted to the inspection of our four judges who frequently found it difficult to reach a decision between two competing models of the same group. The fact that a model failed to win a major prize is certainly no discredit to that model in a collection of this magnitude. They were all a credit to their builders.

They came in all sizes and from all parts of the country—from England, Canada and Hawaii as well as from the U. S. A. They came in all sorts of packages — boxes, suitcases and crates. And unfortunately, in all sorts of conditions. It was not long after we had sent for the models than we were literally swamped with boxes. Strange to say, a model from England arrived in better condition than many models from points in the United States.

In order that all the various types of models would be represented, they were classified under four heads. First, the flying scale models; second, the non-flying scale models; third, the stick models and fourth, the freak models or models of original design. Each group was complete within itself and carried its own prizes so that there would be no conflict nor arguments respecting the relative merits of the different kinds of models.

In the divisions where flying models were specified, no limitations were placed upon the flying ability of the models for it was the purpose of this contest to promote an interest in accuracy and good workmanship rather than ability in terms of duration or distance. To this end, while the models were not flight tested, they were given the most careful scrutiny by the judges.

GRAND PRIZE CHAMPION

Joseph Edwin Geigan, 22 T St., N. W., Washington, D. C.

The holder of this reward is the champion over all divisions regardless of the size or type of model.

* * *

CLASS (1). FLYING SCALE MODEL DIVISION

1st PRIZE. Ole K. Schmidt, 358 Brinsmade Ave., New York, N. Y.

2nd PRIZE. Roy Winterton, Box 221, Paw Paw, Ill.

3rd PRIZE. Ralph Kummer, 5728 Goener Ave., St. Louis, Mo.

MEDALS OF HONOR

R. Glenn Rymer, 611 W. Thornton, Akron, Ohio; Lester McBrayer, 615 W. Main St., Turlock, Calif.; Vernon Tuell, R. 2, Box 43, Tucson, Ariz.; J. Pearce, 26 Elms Rod., Heaton Moore, Stockport, England; Charles Fawcett, Jr., P. O. Box 299, Sackville, N. B., Canada; Joseph F. P. Battaglia, 925 3rd Ave., New York, N. Y.; Andre Hooper, 624 Ninth St., Huntington, W. Va.; Gordon Chain, 944 20th St., Huntington, W. Va.; Hubert Brueckner, 2237 Clarence Ave., Berwyn, Ill.; N. Strohmeyer, 923 Wilson Ave., Chicago, Ill.

WINNERS OF FREE SUBSCRIPTIONS

G. S. Lewis, 8 Bradley St., E. 16, London, England; John S. Parke, 281 Wright Ave., Kingston, Pa.; Winfred T. Winters, 1160 Hurd Ave., Benton Harbor, Mich.; Deumar K. Hinckley, 939 Schraf Rd., Cleveland, Ohio; Arthur W. Manchester, 13 Kay St., Newport, R. I.; Geo. A. Scannell, Elgin, Nebr.; Robt. L. Chunn, 806 Acklen Ave., Nashville, Tenn.; Howard G. McEntee, 484 Hanks Ave., Ridgewood, N. J.; Jas. McTaggart, Unity, Sask., Canada; Kenneth Norberg, 19435 Lancashire, Detroit, Mich.

HONORABLE MENTION

Gerald Shattuck, 33 Hastings Rd., Ealing, London, W. 13, England; Rex Bloom, Claypool, Ind.; D. M. Dent, 53 Upper Berkley St., London, W. I., England; Frank J. Kettlhany, 322 Herny St., Nokomis, Ill.; Max Benz, 191-01 102 nd Ave., Hollis, L. I., N. Y.; Fred Schulze, 406 Second Ave., Carnegie, Pa.; Richard D. Dilley, Pelham Manor Rd., Pelham Manor, N. Y.; Harry H. Van Kirk, Jr., Condit, Ohio; Lester B. Hetherington, Fall River, Mass.; Walter Carpenter, 601 E. 15th St., Davenport, Ia.; Stanley Lucas, 5605 S. Sawyer Ave., Chicago, Ill.; Henry K. H. Lee, 1098 S. Beretania St., Honolulu, Hawaii.

Thousands viewed the beautiful display of the contesting models at Marshall Field's department store. This show was an outstanding event in model history.

CLASS (2). NON-FLYING SCALE MODEL DIVISION

1st PRIZE. James Waters Barry, 703 "A" St., N. E., Washington, D. C.

2nd PRIZE. N. Strohmeyer, 923 Wilson Ave., Chicago, Ill.

3rd PRIZE. Austin B. Croshere, Jr., 50 Tremont St., New Bedford, Mass.

MEDALS OF HONOR

Michael Holly, 5405 S. Maplewood Ave., Chicago, Ill.; Basil Blackmore, 608 St. Clarens Ave., Toronto, Canada; Orland Jack, 920 Walnut St., Waukegan, Ill.; Joseph F. Battaglia, 925 3rd Ave., New York, N. Y.; Herbert W. Owen, 50 Mason Drive, New Britain, Conn.; C. E. Norman, Rush City, Minn.; Frank McLaughlin, 5238 Nottingham Ave., St. Louis, Mo.

WINNERS OF FREE SUBSCRIPTIONS

Loyde E. Frederick, 883 Wooster Ave., Akron, Ohio; Ray Chevedden, 9236 S. Park Ave., Chicago, Ill.; William Riesterer, 344 Rosedale Ct., Detroit, Mich.; Philip B. Gaylord, 71 Hamilton St., Hamilton, N. Y.; Art Schessler, 4705 Schubert Ave., Chicago, Ill.; Jack H. Berry, Jr., 29 Main, So., Boston, Va.; A. F. Kitchel, Jr., 3334 Yale Station, New Haven, Conn.; Elkan Axelberd, 2437 S. Fuller St., Bronx, N. Y.; Kenneth Ward, R. F. D. 5, No. 103, Abilene, Kan.; T. D. M. Parker, 5t. Margaret's Albion Rd., Birchington-on-Sea, Kent, England.

HONORABLE MENTION

Gordon W. Crowell, 580 Washington Ave., Belleville, N. J.; Robert V. Smith, 14 Pellett St., Norwich, N. Y.; Thomas McCarthy, 1237 Allison St., W. Philadelphia, Pa.; Kenneth A. Linder, Oakland, Iowa; E. H. Weir, 23 Carnegie Ave., E. Orange, N. J.; William Pinnell, 1319 Ave L, New York, N. Y.; Charles M. Underhill, Jr., 669 Stanley Ave., Long Beach, Calif.; Fred Skelton, 212 N. 14th St., Corsicana, Texas; Willard Rowling, R. F. D. No. 1, Allegan, Mich.; Nels Manson, R. F. D. No. 1, Sioux Falls, S. D.

* * *

CLASS (3). FLYING-STICK MODEL DIVISION

1st PRIZE. Lawrence Phillips, 1621 S. Quaker, Tulsa, Okla.

2nd PRIZE. George Mackie, 7002 S. Halsted St., Chicago, Ill.

3rd PRIZE. Roger F. Parkhill, 3105 4th Ave., S. Minneapolis, Minn.

MEDALS OF HONOR

Robert J. Meier, R. F. D. 2, Louisburg, Kan.; Charles Janton, 1310 Master St., Philadelphia, Pa.; Robert Willoughby, 4100 Highland, Kansas City, Mo.; Henry Garttmeyer, 46 Ft. Washington Ave., New York, N. Y.; Edward Gold, 1929 Dennie St., Philadelphia, Pa.; Harold Mitchell, 48 Highland Ave., Everett, Mass.; David Hogg, 19 Burris St., Hamilton, Ontario, Canada.

WINNERS OF FREE SUBSCRIPTIONS

H. Owens, 50 Mason Drive, New Britain, Conn.; Bill E. Atwood, 4586 Lime St., Riverside, Calif.; Leslie E. Meloon, 31 Mayer Ave., Buffalo, N. Y.; R. W. Janowsky, Unity, Sask., Canada; George Meese, 323 Karl Court, Dover, Ohio; Robert V. Smith, 14 Pellett St., Norwich, N. Y.; Edw. Beevar, 2327 S. St. Louis Ave., Chicago, Ill.; Edward Miller, 794 Maine St., Lawrence, Kan.; John S. Parks, 381 Wright Ave., Kingston, Pa.; Maurice Austill, 511 Ohio St., Lawrence, Kan.

HONORABLE MENTION

Robert Mertens, 551 Stafford Ave., Erie, Pa.; Jos. Buckley, 3461 Jasper St., Philadelphia, Pa.

* * *

CLASS (4). FREAK MODEL DIVISION

1st PRIZE. J. R. Purvis, 18 Gamble Ave., Toronto, Canada.

2nd PRIZE. W. Ewing, 6449 Parnell Ave., Chicago, Ill.

3rd PRIZE. Edward Krayem, Parks Air College, E. St. Louis, Ill.

MEDALS OF HONOR

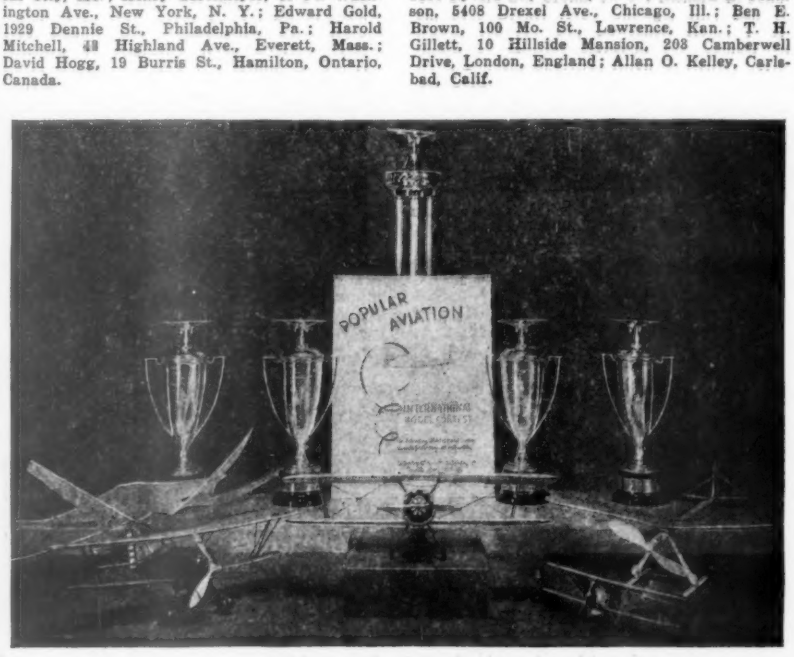
Amilushin Kiran, R. F. D. 2255 Central Ave., Alamenda, Calif.; William Richter, 917 W. 6th Ave., Gary, Ind.; L. Malrose, c/o Bertram Studios, 155 E. Superior St., Chicago, Ill.; Horacio E. Perez, c/o Wagner Cottage, Liberty, N. Y.; Philip Abbinanti, 1440 Winnemac Ave., Chicago, Ill.; Kermit Smalter, 1211 S. 14th St., Milwaukee, Wis.

WINNERS OF FREE SUBSCRIPTIONS

Herman Latta, 1511 Monterey St., Bakersfield, Calif.; Jos. Buckley, 3461 Jasper St., Philadelphia, Pa.; Frank J. Kettelhamy, 322 Harry St., Nokomis, Ill.; Hans F. Marx, 4402 Glenmore Ave., Raspeburg, Md.; Robt. B. Ady, Picher, Okla.; Aldo Betromile, 604 White Plains Rd., Tuckahoe, N. Y.; Howard C. Burr, 616 Lenox Rd., Schenectady, N. Y.; Alan Renn, 1434 Post Ave., Torrance, Calif.; G. Verne Weeks, 2713 N. 47th St., Milwaukee, Wis.; Henry S. Hughes, 2215 Oh St., Sacramento, Calif.

HONORABLE MENTION

Robert J. Cech, 1504 S. 61st Ave., Cicero, Ill.; G. J. DeYoung, No. 4, Ravenna, Ohio; George Mackie, 7002 S. Halsted St., Chicago, Ill.; Lester B. Hetherington, 587 S. Beach, Fall River, Mass.; Bert T. Doi, 626 Chaucer Ave., San Marino, Calif.; Robert Mertens, 551 Stafford Ave., Erie, Pa.; Walter F. Silva, 2349 Davidson Ave., New York.; Charles A. Glock, 2436 Lyvere St., Bronx, N. Y.; Richard B. Johnson, 5408 Drexel Ave., Chicago, Ill.; Ben E. Brown, 100 Mo. St., Lawrence, Kan.; T. H. Gillett, 10 Hillside Mansion, 203 Camberwell Drive, London, England; Allan O. Kelley, Carlsbad, Calif.



Here are the grand prize winner and the first prize divisional victors together with the trophies won by them.

Joseph Edwin Geigan, winner of the Grand Prize and supreme model champion of the contest.

AFTER the most careful scrutiny of the four divisional first prize winners, the judges awarded the Grand Prize to Joseph Edwin Geigan, 22 T. Street, N. W., Washington, D. C., for his Vought "Corsair O201."

This model was outstanding in its class from all possible view-points. It was complete down to the minutest details, the workmanship was exceptionally fine and the finish was wonderfully well applied. It was well worthy of the prize awarded to it for it proved as popular with the visitors as with the judges.

All of the controls were installed in the cockpit, dual controls made of brass rods and even such small details as the upholstering of the seat, the fittings and the many other small parts were faithfully reproduced. When photos of the model and the full size Corsair are compared, it is difficult to tell which is the model and which is the actual plane. All controls in both cockpits are operative.

Mr. Geigan writes that the engine proved the most difficult part to make, for it was entirely made by hand from cardboard composition washers. About 400 washers were cut out to complete the cooling ribs alone. And all of this work on the engine is only representative of the work spent on other details we could mention almost without end.

* * *

OLE K. SCHMIDT, New York, N. Y., the first prize winner in the scale flying model division has been awarded this prize because of the many outstanding features of his Curtiss P-6E

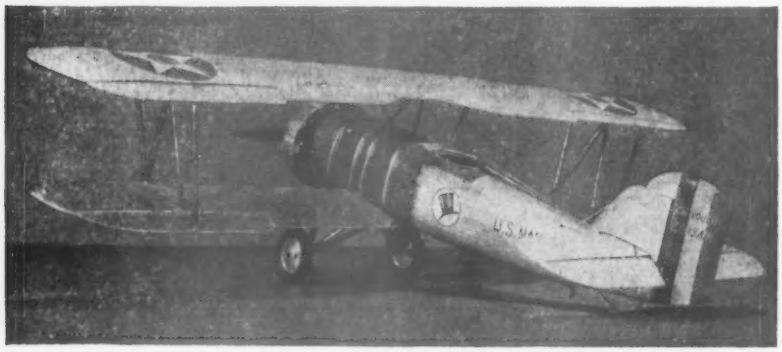
(*Continued on page* 244)

The Grand Prize Winner and Trophy

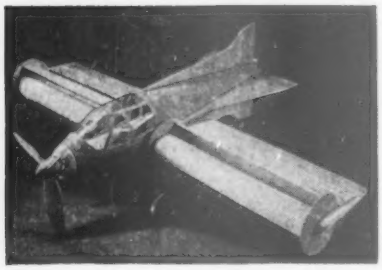
ABOVE. The Grand Prize winner and the silver colonnade awarded to it by the judges of the contest. INSERT. The controls in the cockpit and other small details are true to life.

The third prize winner in the flying division was the "Tiger Moth" entered by Ralph Kummer. It was a very neat and attractive bit of work as will be seen from the photo above.

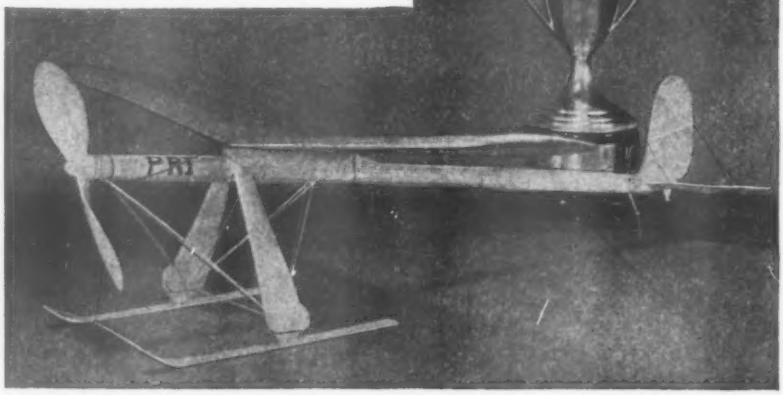
Here's the giant Curtiss Hawk compressed air model with its builder, Edward Krayem. It took third prize in the Freak Division and was many times larger than the majority of models exhibited.



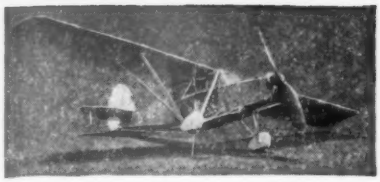
A close-up of the Grand Prize winning Vought Corsair O2U1 built by Joseph Geigan. As indicated by the insignia, this is a model of one of the Corsairs in the "High Hat" squadron.



This is the rotor ship entered by Horacio Perez in the Freak Division. The rotors were of the fluted type, differing from the smooth rotors used on the majority of rotor machines.



Lawrence Phillips, first prize winner in the Flying-Stick Division displayed a novel design having a tubular motor stick provided with skids. It was a clean cut job throughout.



J. Pierce, England, sent a "Moth" model clear across the Atlantic to compete in this contest, and the model is exceedingly well constructed.

Here is a freak model invented by Willard Ewing that has many interesting points of freakishness. Note the double hulls and duplex rotors. Second Prize, Freak Division.

Joseph F. P. Battaglia produced a wonderfully finished model of the "Akron Fighter." It was complete down to the hooks, but was exceedingly heavy for a flying model.

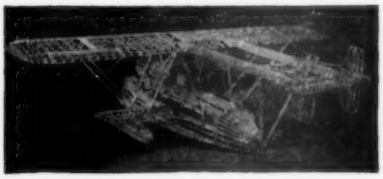
Here are the judges hard at work. From left to right, they are: Major Reed Landis, Joseph S. Ott, E. M. Laird and B. George Davis, Editor of Popular Aviation.

Major Reed G. Landis is the fourth ranking American ace, and is credited with twelve official victories. Joseph S. Ott is the model editor of POPULAR AVIATION *and the author of a standard book on models.*

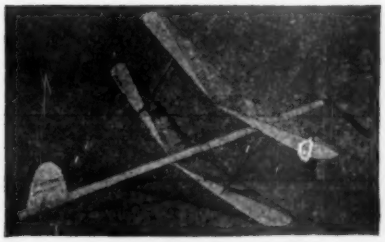
E. M. (Matty) Laird is the president of the Laird Airplane Co., builders of such noted racing planes as the Laird "Super-Solution."

George Mackie submitted this beautiful twin-pusher stick model which was unusually well made for a model of this type. It is an R. O. W. Seaplane. Second Prize, Stick Division.

James Barry and his prize winning Great Lakes Trainer model.



Basil Blackmore, spent a tremendous amount of work in building this skeleton Sikorsky which was complete in every detail. Parts are numbered by the hundred. The builder, a Canadian, did not hold his model true to scale.



Roger F. Parkhill built an original type of stick model of the biplane order. Third Prize, Stick Division.

Model Contest

(*Continued from page* 241)

Hawk. This model has a span of 23½ inches and is 16 9/16 inches long.

All of the details are complete down to the skeleton of the pilot and his removable goggles. The controls are operated from the joy-stick held in his hand and the rudder stirrups attached to his feet. There is a full set of instruments with a celluloid crystal on the face of each instrument. Then there is the radiator grill, machine guns, pitot tube, rubber tired tail wheel, adjustable stabilizer and the auxiliary gas tank.

In its flight tests the model balances well and makes good landings, but its duration is necessarily decreased by the short rubber. However, it flies fast and glides well.

* * *

SECOND PRIZE. The winner of the second prize in the flying scale model division was a Tri-motor Ford 5D transport model that carried a tremendous amount of detail. It was built by Roy Winterton, Paw Paw, Ill.

It has a span of 27 inches and weighs about 4¾ ounces and it took about two months of constant work to complete the job. The motors, wheels and similar parts were purchased from the dealers, but the rest of the ship was put up by hand. It is a most realistic model, even to the corrugating of the surfacing which was accomplished by running lengths of thread and cementing with paper cement. This produced the corrugations which were afterwards treated with silver dope.

The power plant consists of eight strands of 1/32 x ⅛ inch rubber about 9 inches long. This drives the nose prop while the other props are driven through rubber belts and gears.

And another thing that made this model so popular with the judges and the visitors, was the cabin interior. The passenger compartment is completely equipped with chairs, window curtains, carpet and other details, while the pilot's cockpit has working controls, instrument board and bucket seats. It has made flights of about 30 feet in length.

* * *

THIRD PRIZE. Ralph Kummer, St. Louis, Mo., contributed the model of the English "Tiger Moth" that won the third prize in our contest. This model, which was made from raw materials, has a span of 30 inches and weighs about 2 ounces.

All of the controls are movable, the ailerons and elecators being operated by the joy-stick in the cockpit. Good flights have been attained with the model which has a 30-second duration.

* * *

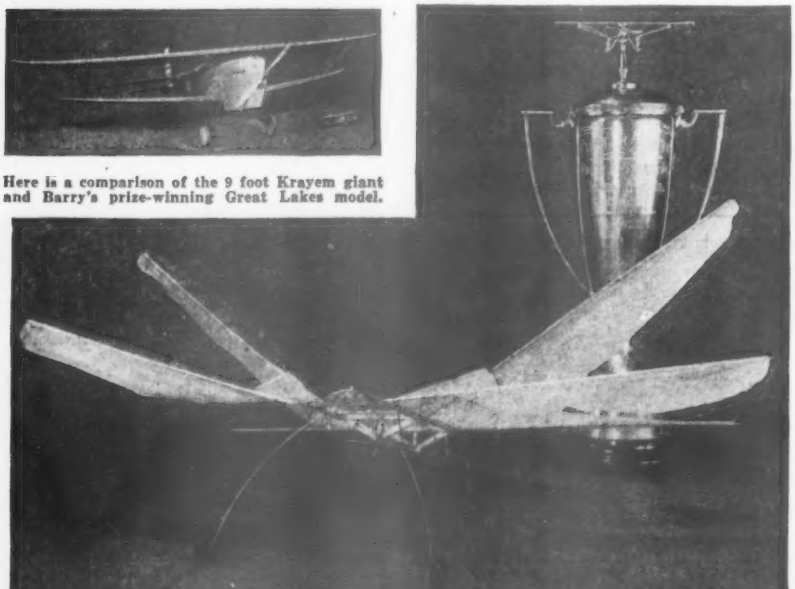
CLASS (2) NON-FLYING SCALE MODEL DIVISION

FIRST PRIZE. James Barry, Washington, D. C., carried off first honors in the non-flying scale model division with his small replica of the Great Lakes Torpedo Plane, Model TG-1. This was a most carefully finished model, very complete in detail.

The model is completely armed with three Browning machine guns and a torpedo beneath the fuselage. A wireless antenna is placed in the right wing panel, there is an arresting hook for carrier landings and the wings fold back to the tail for stowing in the hull of the carrier. The torpedo rack is of the Mark type. The wing span of the model is 13 15/16 inches while it is 9⅛ inches long. To have the exact shade of color, aircraft dope was used instead of paint, but even using dope, the finish was exceedingly smooth and and lustrous.

(*Continued on page* 252)

Here is a comparison of the 9 foot Krayem giant and Barry's prize-winning Great Lakes model.



J. R. Purvis constructed this flying ornithopter which took first prize in the Freak Division.

Purvis, a Canadian, submitted several unusual flying freaks in the contest.

The beautiful Sikorsky non-flying model that gave the second prize in this class to N. Strohmeyer.

A very complete tri-motor Ford was entered by Roy Winterton. It is a flying model that is complete in detail down to the carpets and seats. The controls and all props are operative.

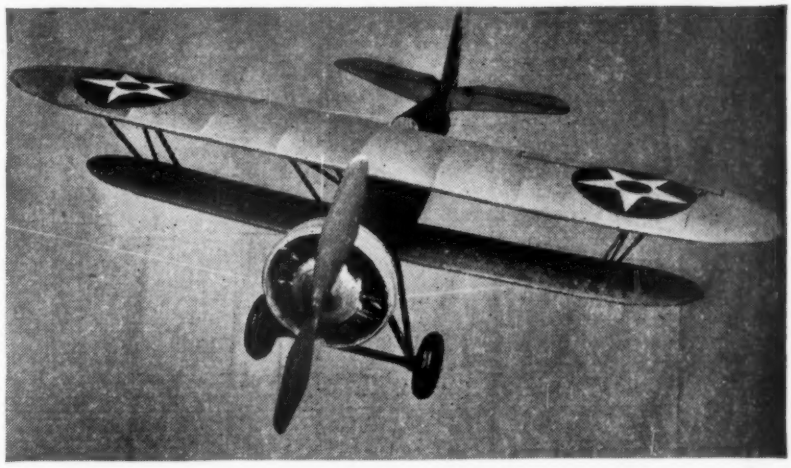
Ole K. Schmidt won first place in the flying scale model division with this Curtiss P-6E.

Building the Boeing P-12F

by

JOSEPH S. OTT

Model Editor of POPULAR AVIATION



The completed model of the Boeing P-12F, covered and ready to fly. This original model has proved to be a speedy and stable flyer that is well worth building.

BEGINNING this month, the drawings for the flying scale models will be increased in size and cover two full pages illustrating the three views to one-half scale. The full size models will have a wing span of 20 inches.

The first drawing on the following page shows the side and front views. All the sections through the body, the wing ribs and the stabilizer ribs are full size. This will simplify the work necessary to increase the model to a 20 inch or a 30 inch span.

All enlarging is readily accomplished by using a pair of dividers, measuring the overall depth or height, then using the divider from one point on the center line and marking off on each side or above and below as required.

FUSELAGE ASSEMBLY

To help the builder, step by step, the stages of construction should be followed as numbered. If a 20 inch model is desired, a rough drawing to scale should be sketched showing the position of the longerons only. This is shown in photograph No. 1.

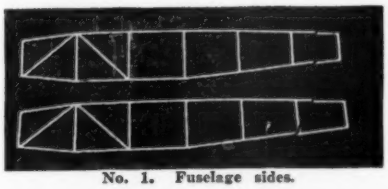
Construction photograph No. 1 illustrates the left and right body sides completed. The material used is light balsa 1/16 inch square. Construction photograph No. 2 shows the two sides assembled with cross members and completes the first step of the body in its square form.

Photograph No. 3 shows the square body with the wooden formers cemented in place. These formers are taken from the sections of the body illustrated on the plan view and include seven cross sectional views. After this step has been completed, the next step will be to put the cockpit in place. This is made from a thin sheet of balsa approximately 1/64 of an inch thick.

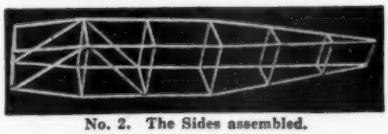
Continuing the work as illustrated in construction photograph No. 4, the longitudinal fairing strips are added. These are placed over the formers and cemented in position, two on each side, three on the bottom and three on the top in front of the cockpit. Only two are shown from the rear of the cockpit to the tail post. A piece of stiff paper is used for streamling the headrest.

LANDING GEAR CONSTRUCTION

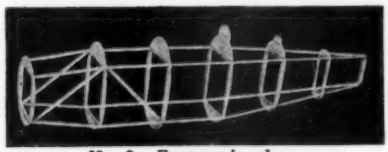
Photograph No. 5 illustrates the landing gear assembly without the center struts. These are added after the landing gear is attached to the body.



No. 1. Fuselage sides.

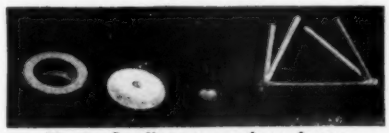


No. 2. The Sides assembled.

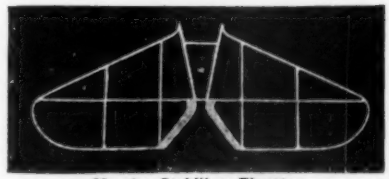


No. 3. Formers in place.

No. 4. The fairing strips are added.



No. 5. Landing gear and crankcase.



No. 6. Stabilizer-Elevator.

The spreader board of the landing gear has a groove 3/32 inch square, cut on the top side before it is cemented to the landing gear uprights. The front landing gear strut has a slot 3/32 inch wide cut up into it for a length of 5/8 inch. The slot in the spreader board will receive a square bamboo axle which is tied and cemented securely at the center where the small "V" brace meets the landing gear spreader board.

The ends of the axle are rounded off so that the wheel will turn without binding. Note the slot arrangement in the front strut on the side view drawing.

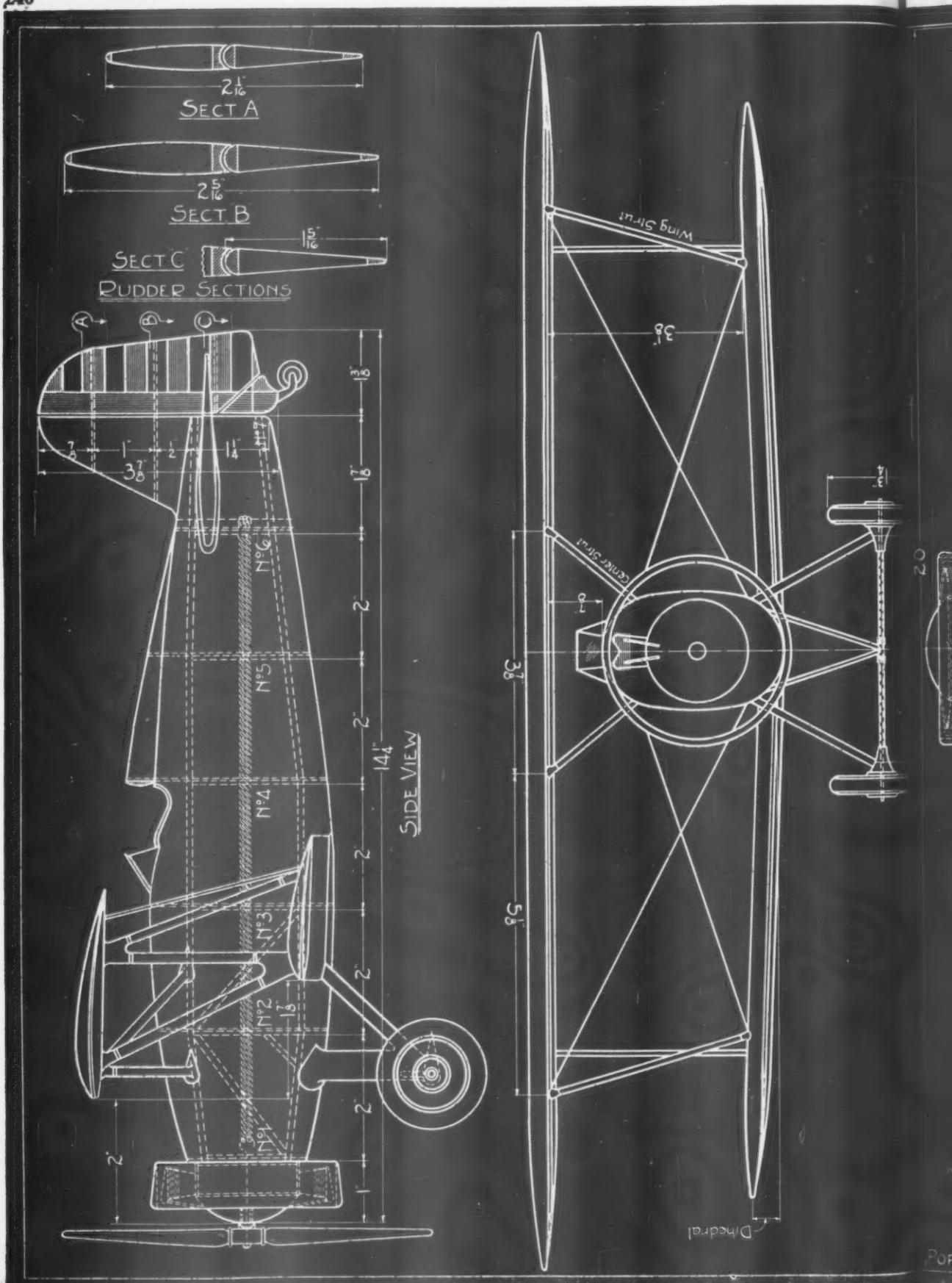
CRANK CASE—NOSE—PLUG BEARING

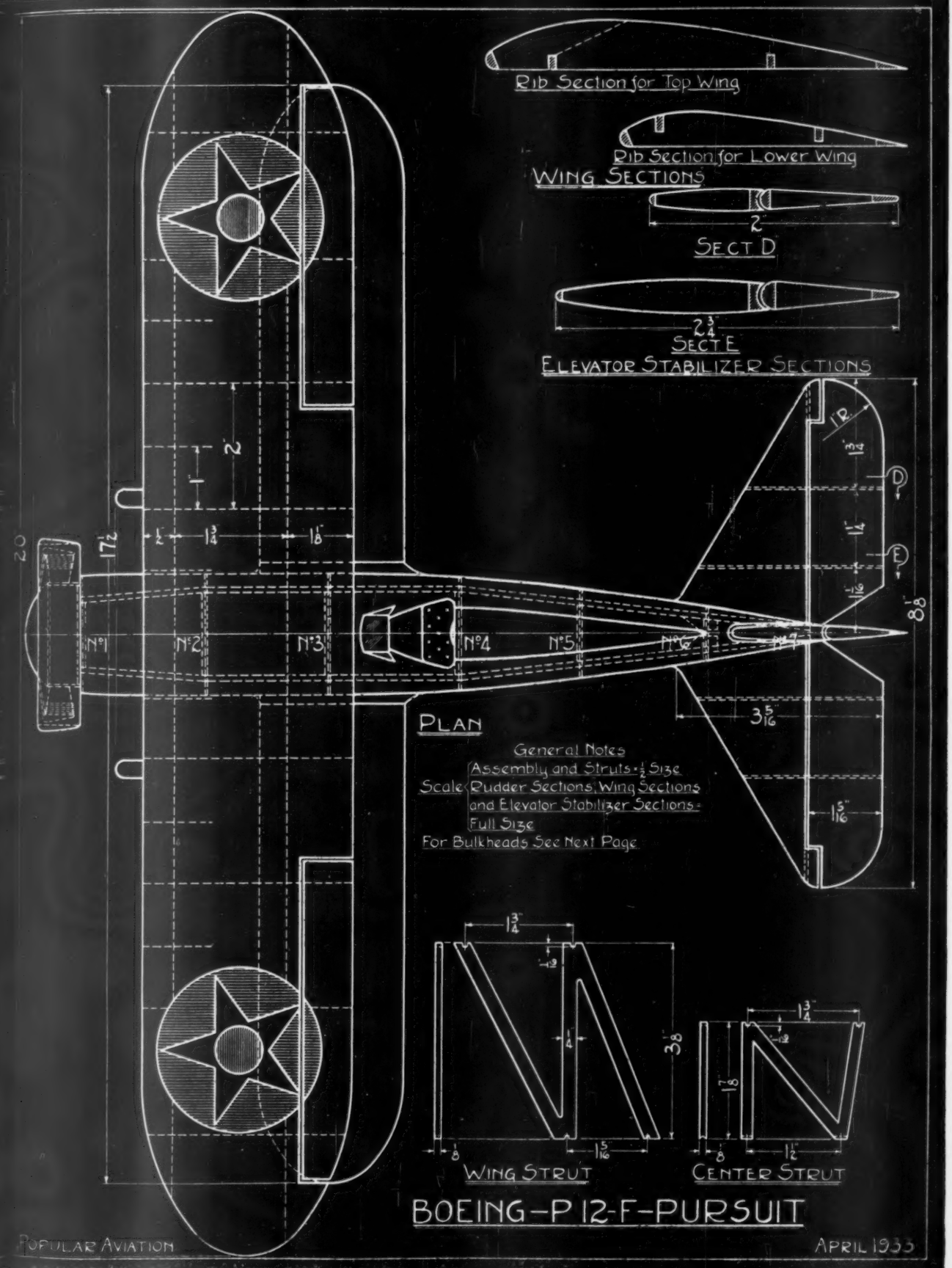
On Photograph No. 5 is also illustrated the simple crankcase construction which consists of two rings 1⅝ inch in diameter spaced ¾th inch apart and covered with thin balsa 1/32 inch thick. The grain of this balsa runs fore and aft. The nose block is semi-circular piece of balsa made from one block or two small sections ⅛th inch thick having the same diameter as the crankcase.

A hole in the center, 5/16 inch in diameter is drilled to receive the plug bearing. The plug bearing is made from hardwood and can be turned up on a lathe so that it will not slip through the hole in front of the crankcase. The shaft goes through the plug bearing to make a snug fit which will prevent the shaft from wobbling.

Construction photograph No. 7 shows the body with the landing gear, the wheels, the rudder and one cylinder

(*Continued on page* 248)


2 1/16"
SECT A
2 5/16"
SECT B
1 5/16"
SECT C
RUDDER SECTIONS
A
B
C
7/8
1"
1/2
1 1/4"
3 7/8"
1 3/8"
1 7/8"
2"
2"
2"
2"
2"
2"
1"
14 1/4"
N°6
N°5
N°4
N°3
N°2
N°1
SIDE VIEW
Wing Strut
3 8"
Center Strut
1 3/4"
3 8"
5 8"
Dihedral



BOEING-P 12-F-PURSUIT

XUM

Boeing P-12F

(*Continued from page 245*)

attached to the crankcase.

DUMMY ENGINE

The crankcase should should be attached to the front of the body and nine celluloid cylinders are cemented around it. These cylinders may be obtained from model shops or a motor can be cut up, saving only the cylinders. The reason this construction is used is to make the motor to scale.

Most celluloid motors on the market do not have the proper crankcase proportions. Another advantage is that the cylinders used this way are lighter than when a complete celluloid motor is attached.

RUDDER—"N" STRUTS

The rudder has an outline of bamboo built to dimensions specified for the 20 inch model. The lower part of the rudder has a section of balsa wood to which is attached, a small wire strut which holds the tail wheel in place. The balsa ribs and the upright spar are all made from 1/32 inch balsa.

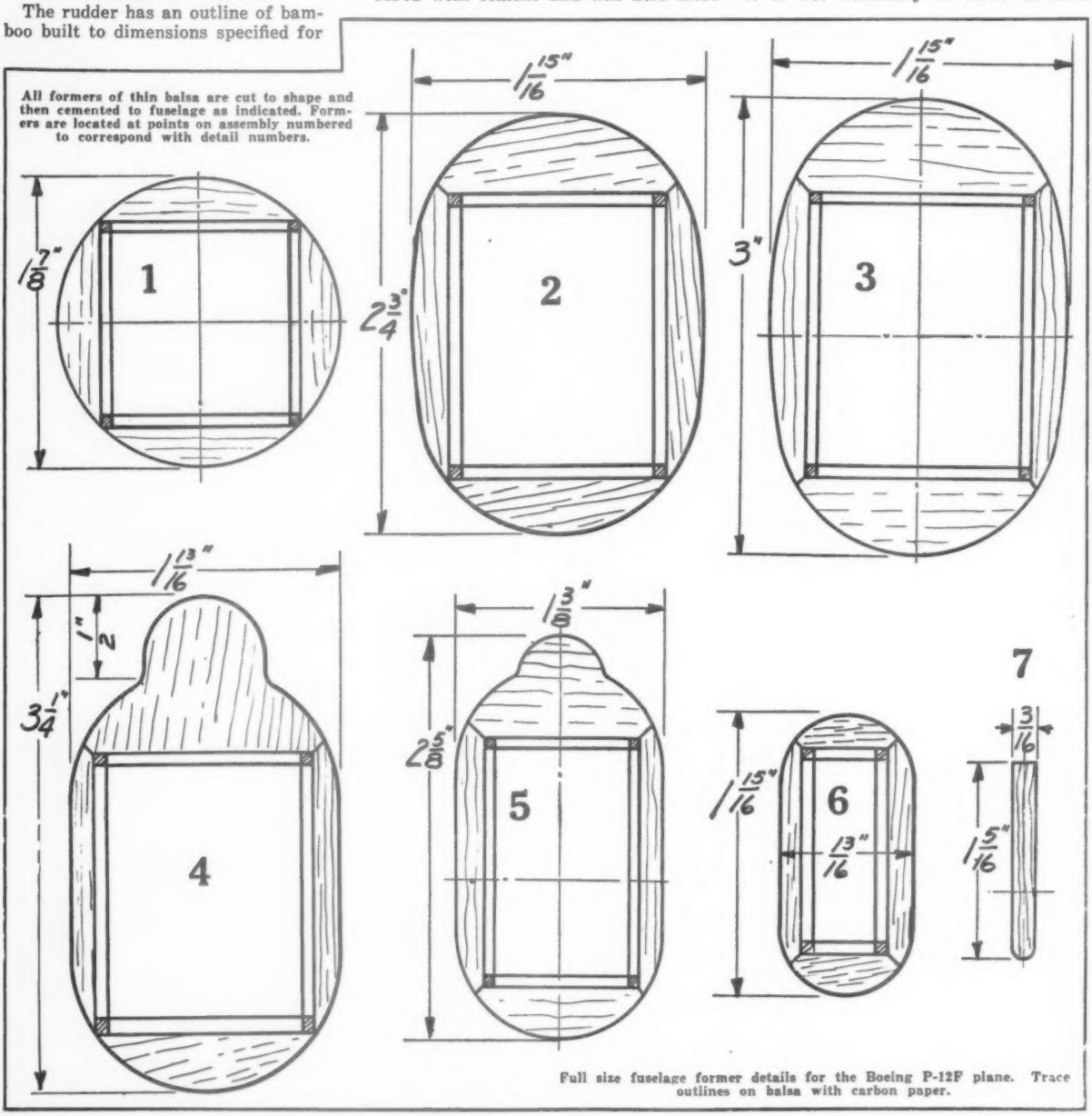
The maximum depth of the spar is ¼ of an inch. The wheel is ½ inch in diameter and may be turned up on a lathe from hard wood or made by cementing two thin pieces of balsa wood together with the grain running in opposite directions.

Two sizes of "N" struts are illustrated with full dimensions on the drawings. These are made from ⅛ x ¼ inch balsa. Note the small notches on the upper and lower ends of the large "N" strut. These notches are 1/16th inch deep and 1/16th inch wide. They rest against the spars, are secured with cement and will hold more firmly this way than if they were only resting against the spar. The small "N" struts, which reach from the body to the top wing have a similar small cut-out section on the top side but on the bottom edge there is a small "V" groove which fits up against the top longeron.

STABILIZER CONSTRUCTION

Photograph No. 6 illustrates the stabilizer and its general method of assembly. The outline is bamboo with the ribs and spars made of 1/32 x ¼ inch balsa. The inside elevator construction is a piece of balsa, the same width as the spar and tapers to a fine edge at the rear. The elevators and the stabilizer are made of one solid piece as separating these parts would require additional spars and increase the weight. For the flying scale model it is not necessary to have movable

All formers of thin balsa are cut to shape and then cemented to fuselage as indicated. Formers are located at points on assembly numbered to correspond with detail numbers.



Full size fuselage former details for the Boeing P-12F plane. Trace outlines on balsa with carbon paper.

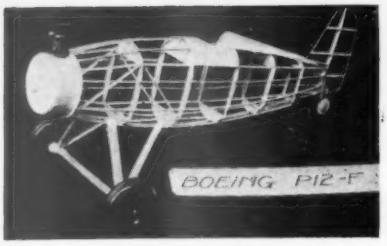


Fig. 7. Body with crankcase.

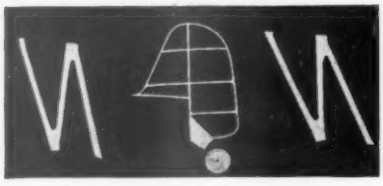


Fig. 8. Rudder and "N" Struts.

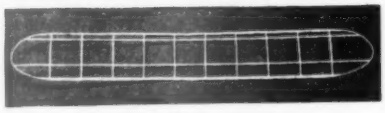


Fig. 9. Lower Wing.

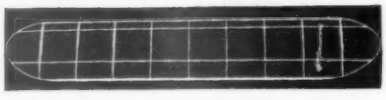


Fig. 10. Upper Wing.

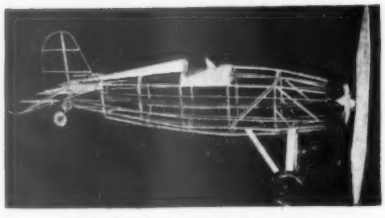


Fig. 11. Completed Fuselage.

controls but the outlines may be marked.

WING CONSTRUCTION

Photographs No. 9 and No. 10 illustrate the lower and upper wings respectively. The ribs for the upper wing are spaced 2 inches apart and the ribs for the lower wing are 1½ inches apart. The material used for the ribs should not be over 1/32 inch thick.

The spars for both wings are 1/16x⅛ inch.

The spars in the upper wing are placed on the underside while the spars for the lower wing are placed on the top. This will allow the wing struts to make direct contact with the spars. The entering edges for both wings are made of 3/32 inch balsa.

Shape the entering edge to a form in keeping with the wing section. The trailing edge for both wings is 1/16x 3/16 inch. The wing tips are all bent bamboo 1/32x1/16 inch.

COMPLETED FUSELAGE

Photograph No. 11 shows the fuselage fully assembled with the complete landing gear, the 9-cylinder motor, the plug bearing, the propeller and the rubber all in position. The stabilizer and rudder are attached temporarily and should be removed while the body is being covered. Note on this view that there is a small additional brace on the fuselage longeron where the front strut of the landing gear is attached.

MAKING THE PROPELLER

The propeller for the flying model should be approximately 7 inch diameter. This is a trifle over 1/3 of the wing span. This proportion if carried out on flying scale models will prove about the best and most successful. If a true scale propeller were used, the diameter would be about 6 inches and the thickness and width would be too small to allow this model to make successful flights.

COVERING THE MODEL

Both the wings are covered with yellow tissue. The lower wing is cut in half and later attached to the body and securely cemented in place with a small additional balsa strip holding the two halves together. These pieces can be placed in position to the cockpit after the body has been covered.

When placing the lower wings on the body be sure to give each one a small dihedral angle. The body is covered with khaki tissue. The stabilizer and fin are all yellow, with a blue stripe running up and down on the rudder and with red and white horizontal stripes. All control surfaces are outlined with black tissue.

The landing gear and struts, including the cockpit section and the streamlined headrest, are colored in black. Both wings are given an angle of incidence of ⅛ inch. After the complete model has been assembled the windshield is put in place.

The rubber motor is held in position at the rear with a small piece of balsa ⅛x¼ inch which is inserted from the under side of the fuselage. To allow this brace to be put in position, the lower part of the fuselage beneath the longerons from station 6 to 7 is cut away.

THE DRAG RING

The drag ring illustrated in the finished photograph of the model may be added or left off depending upon the builder's choice. The rings may be purchased finished — made from aluminum. They may also be built up from balsa wood.

Two layers of 1/16 inch balsa with a layer of paper underneath and a layer of paper between the balsa will make a strong drag ring. The outside may be sanded to conform to the illustration on the top and side views of the drawing. Use a bottle or glass with the correct diameter allowing approximately 1/16 inch for shrinkage. The drag ring, the propeller and the crankcase are all painted aluminum.

TESTING MODEL

Before trying to fly the model under its own power, it is a good plan to glide it. Hold the model horizontally in flight position, and about four feet above a smooth floor. Now, propel it forward with a fast uniform motion (do not throw it) and release it quickly, allowing it to glide.

If it is properly balanced, it will glide from 15 to 20 feet before it touches the floor. If it noses down sharply or dives, it is "nose heavy" and a small weight should be attached near the tail to correct this trouble. If, on the other hand, it settles down flat or dives backward tail first, it is "tail heavy" and will require the addition of a small weight near the nose. Experiment alone will tell when it is properly balanced.

For the best results, the model should be inclined toward nose-heaviness as the propeller always tends to pull up the nose when in flight. If slightly nose heavy, it will then automatically nose down and start to glide the moment that the motor rubber is unwound and will then make a good landing.

If the model is tail heavy, then it will drop tail first as soon as the propeller slows up, and there will be a fine crash. The balance should therefore be taken care of before flying else there will be a disastrous crack-up.

Editor's Note This flying model is a perfect scale model of the Boeing P12-F, and was designed and built from plans furnished by the Boeing Airplane Company.

MATERIAL LIST

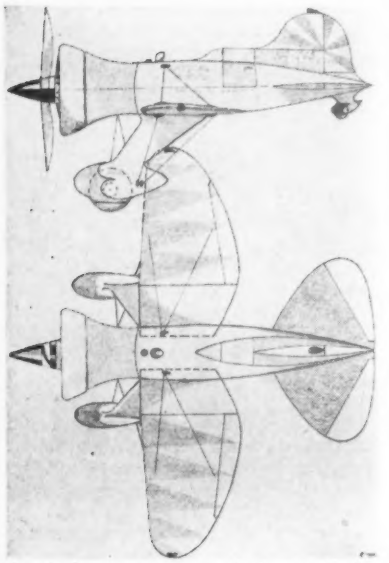
1. Longerons	1/16 x 1/16 x 18"	Balsa	8
2. Spars	1/16 x 1/8 x 18"	Balsa	4
3. Leading Edge	3/32 x 3/32 x 18"	Balsa	2
4. Trailing Edge	1/16 x 3/16 x 18"	Balsa	2
5. Fairing Strips	1/32 x 1/16 x 18"	Balsa	10
6. Bearing Block	1/4 x 1⅝ x 1⅝"	Balsa	1
7. Propeller	7" diameter	Balsa	1
8. Struts	1/8 x 1/4 x 18"	Balsa	2
9. Ribs—Formers	1/32 x 3 x 18"	Balsa	1
10. Wing Tips	1/16 x 1/16 x 12"	Bamboo	4
11. Tail outline	1/16 x 1/16 x 12"	Bamboo	4
12. Axle	1/16 x 1/16 x 12"	Bamboo	1
13. Bearing	5/16 x 5/16 x 3/8"	Hard wood	1
14. Shaft	.024" diameter	Piano Wire	1
15. Washers	⅛" diameter	Brass	3
16. Rubber motor	1/32 x 1/8 x 60"	Rubber	1
17. Wheels	1⅞" diameter	Celluloid	2
18. Wheels	½" diameter	Wood	1
19. Cement	tube	Clear	1
20. Banana Liquid	bottle	Clear	1
21. Sandpaper	2 x 8"	Fine	1
22. Tissue	21 x 24"	Yellow	1
23. Tissue	21 x 12"	Khaki	1
24. Cellophane	1 x 3"	Windshield	1
25. Emblems	3" diameter	Stars	2
26. Emblems	To fit	Tail Stripes	2
27. Dummy Motor	K. D. set	Celluloid	1
28. Cowl	3" diameter	Aluminum	1

XUM

Dream Ships--by Our Dreamers

Here are a few of the many dream-ships submitted this month. Look them over critically—perhaps you can do better.

A Chaste Design



An Arabesque treatment of the speed plane problem.

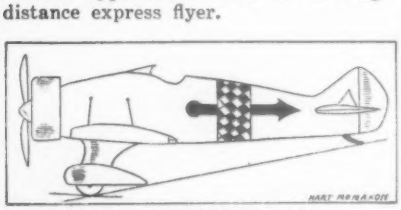
MAXWELL ROBERSON, 692 "B" Street, Ashland, Ore., has entered a dream-ship which smacks of originality from spinner cap to tail. But we just wonder how the reversed streamlining of the fuselage will work out in practice. It follows what might be called Moorish architecture with a sort of comic opera atmosphere.

According to the proud designer, it is powered with a 122 rabbit power engine and is priced at 80 horse-blankets —used kiddie cars will be taken in trade. Annyhoo, it's an artistic drawing and displays a most startling decorative scheme.

McMahon Shows One

MR. HART McMAHON has submitted his dream of beauty, utility and desirability which we show below. Its general lines suggest an attack plane, of the low wing army type and is suggestive of power and speed. As a matter of fact, it has a resemblance to the speed buggies that Doolittle likes to buzz around in.

Then, again, it might be that a ship of this type could serve as a long distance express flyer.

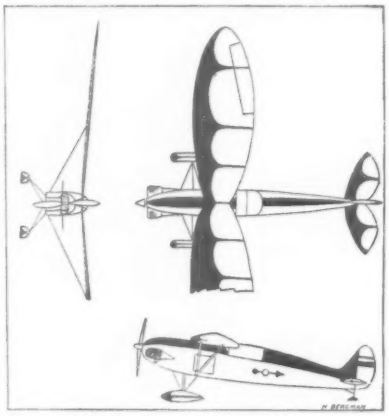


Well, here it is, McMahon's idea.

OUR readers have shown so much interest in dreamships and dreaming that we have decided to devote a special department to this subject—and here it is.

Now that it is started, please remember, that is you and you only who can keep it going. So, just sketch up that idea of yours and send it in. Send in as many as you can, and we will make a special attempt to print them.

Dreams of Bat Wings



A bat-wing for fur traders.

H. BERGMAN, Norman, Ont., Canada, has been doing a little dreaming this winter with very successful results. He shows a High-wing gull or bat type monoplane which should scoot along quite rapidly.

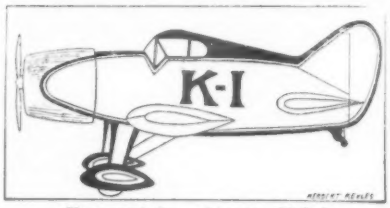
This is a special purpose ship to be used for trading in the North Country, and as such it is really a very nicely laid out ship. To meet with different flying conditions it is convertible so that it can be quickly turned into an O. C. plane by removing the cabin top.

It is a 1-place ship with a compartment for carrying articles of trade or furs, and is intended to be powered with a 45-60 h.p. two-cylinder engine. This should do the trick and might be a type that would fill a great need in the north.

Here is just another idea for our dreamers to work on. Design special purpose ships for some special requirement. So far we have dealt most with racing and sport-planes, but say that we get out of this rut, go places and see things.

He also sends us a very interesting photo of a snow sled which he has built which makes 50 m. p. h. on moderately soft snow. We will show this separately in another issue for it is worthy of special mention.

A 14 Year Dreamer Dreams



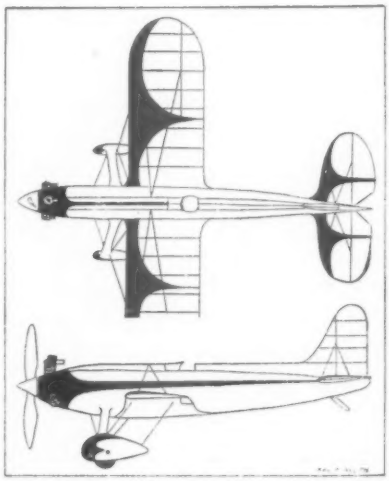
Very good for a 14 year old lad.

HERBERT KEVLES (wish he had printed his name), 13 S. Robinson St., Philadelphia, Pa., has been disturbed at night by thoughts of a bobtailed speed cabin which is pictured here. Really, we think that this is a most commendable job, good enough for many an older and more hardened dreamer. He claims that it is designed for speed and beauty and he wins, very nice, Herbert.

The Allen Super-Racer

HERE'S a nice job by Ben F. Allen, 116 Austin St., Lamesa, Tex., whose dreams have evidently been more or less influenced by the Heinkel ship. We admire this type of architecture very much but doubt whether a 50 h. p. Aeromarine could shove it along at 198 m. p. h. unless the pilot buckled in and helped it out.

Just as a suggestion, we introduce the idea of a retractable landing-gear and tail-skid and also a cowl for the cylinders which will prove of great assistance above 125 m. p. h. However, it's a keen looking buggy and might get within shooting distance of the top speed aimed at by its optimistic designer.



Full of speed and, we hope, good control. Wonder if she can do her rated 198 m.p.h.

BARTER AND EXCHANGE DEPARTMENT

A USEFUL SERVICE FOR OUR READERS

This service is free, but the publishers reserve the right to reject any or all notices that are not in accord with the policy of this magazine. Only trades or "swaps" will be permitted. For cash deals, buying or selling, refer to our Buyer's Directory. When sending notices, kindly print your name and address plainly to avoid errors. Readers are urged to use caution in arranging trades.

AIRPLANES

JENNY (JN4D) with OX-5 engine, in fine flying order. Will trade this ship for a late model car, a portable public address system or what have you?—Clayton Black, 13½ S. Clay St., Peru, Ind.

HEATH PARASOL, Type 1-P.O.L.M., Identification No. 11497. Complete less engine. Green fuselage, orange wings, 2 five gallon wing tanks, Cessna throttle, switch, oil temperature guage, oil pressure guage, U. S. Navy altimeter, Tachometer, seat cushions, special Waco split type shock cord, landing gear, 18x4 Goodrich and Goodyear tires, aluminum wheels, steel fuselage. Will trade, complete less engine and prop. What have you?—A. L. Dodson, Jr., 322 E. Town St., Columbus, Ohio.

AMERICAN-EAGLE—Cracked. Will trade this biplane for a car of equivalent value. What have you to offer?—A. A. Schneider, Lakota, N. Dak.

HEATH PARASOL adapted for Anzani engine. Complete except for the engine and covering. Welded steel tube fuselage. Will trade for late model motorcycle or what have you?—Kermit Stockton, St. Paris, Ohio.

AIRPLANE WANTED. I want a one, two or three-place, or will consider a partly finished plane, or an OX-5 job less the engine. Will take a plane needing recovering or a plane slightly cracked. License not necessary. Write full particulars, including photo, and tell me what you want.—John A. Cysenski, Courtenay, N. Dak.

CORBEN BABY ACE, cabin monoplane, less engine and instruments but otherwise complete, including engine mounting and cowling for Szekely Model 0, 45 h. p. engine. This is a factory job which has never been cracked up and is being sold because of the stringent anti-aircraft laws. Will trade for a late model light-car or what have you?—T. G. Miller, 3435 E. Murdock, Wichita, Kansas.

HEATH PARASOL wanted. I want a Heath Parasol in good condition. It must have an NC license. Send me a photograph of this ship, and also tell the name of the engine and the time on the engine and plane. What do you want?—Z. Sajkowicz, 22 Howard St., Norwich, Conn.

TRAVELAIR, identified, OX5, 3-place job. In excellent condition, always been hangared, new covering. Only 2 hours on engine since top overhaul. Will trade for Challenger-Robin or any 2-place air-cooled inclosed job such as Rearwin Jr., N. B. Trainer or Aeronca. Will pay difference in cash.—A. Kuball, Jr., Dresden, North Dakota.

LICENSED WACO 10, NC. 3909. Has had 12 hours since thorough rebuilding and recovering. All work done by licensed mechanic. Will exchange it for an aircooled job needing covering, preferably a Fleet or something in that class. Will also trade for a good late model automobile. Write or wire—W. P. Henderson, 309 Ramsey Ave., Hopewell, Va.

AIRPLANE SUPPLIES—PLANS

LINCOLN FUSELAGE, Thomas-Morse Scout wings, part of Heath wing, Heath brace wires and tail group. Make offer. Want airplane engine, guns, motorcycle, etc.—K. L. Swigart, Windham, Ohio.

THOMAS-MORSE Scout wings, also a welded tail-group suitable for a lightplane. Also have a 4 tube A. C. Short-wave radio converter, .22 caliber bolt-action rifle and a complete line of radio service parts. What have you? Write for details.—Orville B. Kinsley, 802 16th St., Niagara Falls, N. Y.

WACO 10 FUSELAGE, Model G. X. E., Adapted to OX-5 engine. I will trade for this fuselage if in licensable condition. Please write particulars and tell me what you want.—C. Kenneth Hoequist, Route 1, Orlando, Fla.

AIRWHEELS WANTED, one or two wheels, to be used for glider or lightplane. I also want any type of landing gear for a primary glider. Have much to trade. What do you want?—Walter Lacy, Sec., The Albatross Gliding Club, Route 6, Knoxville, Tenn.

BERLING MAGNETO, 8-cylinder type. Will trade for aeronautical materials, aeronautical books or what have you?—Alex J. Schultz, 2221 Menard St., St. Louis, Mo.

PLANS FOR FORD "T" single-seater lightplane, wanted. Write particulars.—Jack Humphrey, Moscow, Idaho.

AERONAUTICAL SUPPLIES wanted. Will trade one pair of Luxor No. 5 goggles, with aluminum case; all-electric radio tubes, 225 power amplifier tubes, three 227 detector-amplifier tubes, two 280 full-wave rectifier tubes and eight 226 amplifier tubes.—N. Alsbrook, 1148 Armstrong, Kansas City, Kansas.

OX-5 PROPELLER, and sheep lined flying suit with zipper fasteners, like new. Interested in small car, Maytag engine or lightplane engine.—Don Draher, Bradford, Ohio.

HIGH-TENSION MAGNETO, 4-cylinder Henderson motorcycle engine, ¼ H. P. A. C. electric motor. Want a 32 volt D. C. motor, Maytag gasoline engine, propeller for Henderson engine or "A" Ford engine. Make offer.—F. B. Dadisman, P. O. Box 34, Mt. Storm, W. Va.

HEATH FUSELAGE, Type VI, wanted. Would prefer it welded and uncovered. Let me know what you will trade.—Raymond Lowery, Patterson Springs, N. C.

AIRCRAFT TUBING and blue-prints for the "Air-Camper" monoplane. Also have pin-target and ball- gum machines to trade. Will trade for a good Colt revolver, milk goats or aircraft parts. What have you?—A. G. Cox, R. F. D. 3, Brazil, Ind.

AUTOMOBILES

CHRYSLER COUPE, Model 29 to trade for any kind of airplane that will meet my specifications. The car has three new tires and two others in excellent condition. Car is mechanically very good having been overhauled recently. The plane need not be licensed, although this would be a point in its favor. Send snapshot of plane if possible.—Ralph Cloid, Box 596, McCamey, Texas.

NASH ROADSTER, Special Six, Late 1927 Model. Rumble seat and wind wings. It is in good condition with a good two-tone paint job. Will trade for a single-seater or a two-place lightplane in good condition, or what have you?—Leo Strickland, Alva, Okla.

FORD MODEL "T" with Frontenac head, Winnfield carbureter, gear shift, wire wheels, etc. Want a motorcycle in fairly good running condition.—William C. Tatina, 8455 Oglesby Ave., Chicago, Ill.

1929 FORD "A" Sport Coupe in perfect condition and a new Heath B-4 engine. Will trade for an Aeronca.—John Peterson, 920 Ninth St., Grand Rapids, Mich.

1929 FORD Sedan. Cost $842 new and is in good condition. Will trade for a lightplane or what have you?—Clarence Mase, 4115 Ottawa Ave., Norwood Park Township, Ill.

1929 DODGE, Model 6, 5-passenger coupe, an aircooled one-cylinder lawn mower, a Conn C Melody Saxophone and most of an old Indian motorcycle. Will trade for a 1-2-3-place licensed airplane or what have you?—Donald H. Card, Jr., R. D. 1, Youngstown, Ohio.

BOOKS AND MAGAZINES

BOOKS. Have Aeronautical Meteorology by Gregg, A. B. C. of Flight by Le Page, Aircraft Engines by Dyke, A Textbook on Aviation by Lieut. Thorpe. Will trade for anything that I can use, such as a small car, Maytag engine or a lightplane engine.—Don Draher, Bradford, Ohio.

MAGAZINES. I have 275 magazines of all kinds, also a canoe. I want a model gas engine, ¾ h. p., weight 3 pounds, or what have you?—Donald Hastings, Chester, Iowa.

MAGAZINES. I have four popular English flying magazines. Will exchange for American magazines, POPULAR AVIATION preferred, or will take model parts or plans.—Murray White, Club House, 40 Sinclair St., Helensburgh, Scotland.

MAGAZINES. I have copies of POPULAR AVIATION, Aero Digest, Flying and Glider Manual. Will trade for English aeronautical magazines.—Pete Lassila, Lock Box 17, Mohawk, Michigan.

BOOKS. Will exchange large books (2) for aero engine in reasonably good condition, an Anzani, Szekely or Lawrence. The large book contains excellent views, mostly of fighting craft, on thick glazed paper. It displays photos and descriptions of 489 types of aircraft. The smaller book contains many ships and gives general arrangement drawings of them.—G. Harris, Belah House, Redworth Road, Hildon, Dhm, England.

CORRESPONDENCE COURSES

AERONAUTICAL CORRESPONDENCE COURSE, complete. Interested in small car, Maytag engine or lightplane engine.—Don Draher, Bradford, Ohio.

CORRESPONDENCE COURSE, Aviation Institute of U. S. A. Want 32 volt D. C. motor, Maytag gasoline engine or a propeller for a Henderson or Ford "A" engine, or best offer.—F. B. Dadisman, P. O. Box 34, Mt. Storm, West Virginia.

CORRESPONDENCE COURSE to trade for other course, cheap car, glider, books or what have you?—D. Copeland, 2298 Priscilla St., St. Paul, Minn.

CORRESPONDENCE COURSE, in Practical Aviation, complete. Cost $60.00. Will trade for used sportplane, glider, converted Model "A" Ford, or ("T"), prop, or what have you.—H. W. Davis, 372 Fifth St., Beaver, Pa.

CORRESPONDENCE COURSE, in Aeronautics. Will trade. What am I offered?—Frank Baunstark, Glen Ullin, Box 313, N. Dak.

CORRESPONDENCE COURSE in Aviation, complete. Want a good primary glider.—Nick Molnear, Patton, Pa.

CORRESPONDENCE COURSE complete, cost $60.00. Will trade for a small aircooled engine or what have you?—Sid Perlman, 1225 Cottman St., Philadelphia, Pa.

ENGINES — MOTORS

SZEKELY ENGINE, Model "O", 45 h. p., total time less than 5 hours, new type reinforced cylinders, complete with oil gauge, switch, tachometer and "supreme" propeller. Will trade this engine for late model light-car, unlicensed OX job, or what have you?—Douglas F. Jackson, 5115 Manila Ave., Oakland, Cal.

FORD MODEL "A" ENGINE, practically new and used less than 5,000 miles. In perfect mechanical condition and just the thing for a Pietenpol conversion. What have you to offer?—C. Ellsworth Kirk, c/o Ford Agency, Geneva, New York.

OX-5 CURTISS ENGINE, less magneto. Will trade for practical aviation books in good condition, and late edition. Will also trade for a model airplane gasoline engine in good condition.—Walter Lilligren, 23 Purchase St., Danvers, Mass.

ANZANI ENGINE, 125 h. p., 10-cylinder radial engine, dismantled. Needs overhauling but nothing is damaged. Will trade for a Velie, Lambert or Leblond in the same condition.—Harold E. Dale, 5342 Cuyler Ave., Chicago, Ill.

2-CYLINDER GASOLINE ENGINE wanted. Small engine of any make will be considered if in good condition. Send me your lists and

what you wish in trade.—Melvin C. Green, 345 Swatara St., Steelton, Pa.

MOTORCYCLE ENGINE wanted, a complete Harley-Twin or any other twin or single cylinder engine, preferably with a hub for the propeller. Will swap rabbits, rabbit hutch or developing pens for this engine.—Orian F. Weil, Pavement Rd., Lancaster, N. Y.

FORD MODEL "T" engine, including propeller in good condition. Has a high-compression cylinder head, good conversion, short stacks, new water circulating system. Will exchange it for an Indian 4-cylinder or a Henderson engine, not converted but in good condition.—Willard Beadle, Route 2, Worland, Wyo.

ZENITH CARBURETER, Berling D-81 magnets, propeller hub, propeller hub puller, wrenches and nuts for OX-5 engine. Also quart size J-M extinguisher. Will trade for serviceable magnetic compass, air-speed indicator, turn-and-bank indicator or what have you in aircraft instruments?—J. R. Dowalo, 144 Thompson Ave., Donora, Pa.

GLIDERS — SAILPLANES

MEAD GLIDER, training type. Flown only four times. Will trade for a Continental A-40 or a Heath B-4 engine, complete and in good running order.—Aldo Sarchiapone, 2496 Amsterdam Ave., New York City, N. Y.

NORTHRUP GLIDER and $1000.00 stock of 16 mm. movie equipment to trade for licensed plane. —Harold Tyndale, Home Movie Supplies, 827 N. Carroll St., Carroll, Iowa.

NORTHRUP GLIDER, primary type fuselage and tail group. Has controls. Tail needs covering. Will trade for a motorcycle, twin preferred.—Ervin Cook, Box 86, Terril, Iowa.

LANDING GEAR for Mead glider. Detachable and adjustable to fit most gliders. Has shock-absorbing struts, low pressure tires and is very sturdy. Value $50.00. What have you?—Charles F. Abel, Box 557, Palatine, Ill.

FRANKLIN OR CADET II glider wanted, in any condition. State particulars.—William Placek, 40 Redneck Ave., Little Ferry, N. J.

SOARING GLIDER fuselage, wing center section, tail-group, tube controls, tailskid, plans, etc. Wings can be built up in a short time. Will trade for a Henderson engine or what have you?—John Niemiec, 12702 Benwood Ave., Cleveland, Ohio.

PRIMARY GLIDER, identification 560W. Will swap for anything that I can use.—Raymond Daggett, George, Iowa.

MODELS — MODEL SUPPLIES

PLANS of my balsa wood cutter that cuts balsa strips up to 3/8" x 1". I will swap these plans for model airplane plans, photographs, 3-view prints and also parts of cracked-up airplanes. What have you?—Wm. H. Bennett, Jr., 58 Holden St., Fall River, Mass.

"ZIP" BALSA STRIPER. Will swap for some old U. S. Coins.—Joseph Purcell, Narrowsburg, New York.

MODEL SUPPLIES, a large assortment and a drawing outfit. This cost me $22.35. Want engine suitable for hedgehopper or what have you?—Stanley Zimbo, R. D. 1, Pennsburg, Pa.

MOTORCYCLES

HARLEY-DAVIDSON twin cylinder, 1925 model motorcycle with sidecar in very good condition. Will exchange for glider or lightplane parts.—Gene A. Holman, Cameron, Wis.

INDIAN "4" MOTORCYCLE, very late model. Special paint job with a lot of extras and sidecar. All in very good condition. Will trade for a lightplane, a Lincoln Sport Plane preferred. What have you—must know at once.—Hector J. Potvin, Black River, Mich.

RADIOS AND EQUIPMENT

RADIO PARTS. I have over $150.00 worth of good radio parts that I will exchange for a plane or engine, or other articles of use to me.—Walter E. Raetz, Box 28, Wabeno, Wis.

S. W. TRANSMITTER, crystal controlled M. O. P. A. type. Will trade for used lightplane or for lightplane fuselage and wing, less engine. Kenneth McCrum, 214 South 4th St., Sterling, Kan.

NATIONAL SW5, short wave set, A. C. type with power pack and five sets of coils. Used less than ten hours. Will trade as part payment on a lightplane in good condition.—B. M. Smith, 603 Baylan Ave., Raleigh, N. C.

S. W. RADIO, musical instruments and complete course in aviation. Will trade for a good primary glider.—Nick Molnear, Patton, Pa.

MISCELLANEOUS

DIAMOND RING worth $35.00, electric course $100.00, shot gun $10.00, portable phonograph and records $35.00, dirigible pictures. Will trade these for lightplane, glider, engine, motorcycle, parachute or two small wheels, preferably 10 x 3. —C. H. Willoughby, Jr., Box 52, Greenland, Ark.

HARD LABOR will be exchanged for an up-to-date mechanics course.—Neil Scanlan, Colegrove, Pa.

HOME MOVIE CAMERA OUTFIT, Cine'-Kodak Model B and Projector. Like new, original cost $165.00. Will exchange for a home-built plane, finished or partly finished, or a used outboard motor. Write your proposition.—A. Warren, 5039 N. Clark St., Chicago, Ill.

STAMPS. Will trade U. S. and foreign postage stamps for built scale flying model.—George Meister, 2109 Evelyn Ave., Cleveland, Ohio.

PICTURE FRAME OUTFIT with enough molding to start business. Will trade for Heath B4 engine in running order. Also have lightplane plans to trade.—Joe Higgins, Richfield Springs, New York.

BICYCLE in good condition, books, pedigreed homing pigeons, back numbers of Aero Digest and POPULAR AVIATION. Willing to exchange for a home study course in aviation, or anything that I can use.—Lionel Willett, 47 Garfield St., Lawrence, Mass.

WORLD WAR RELICS and trophies of every description, everything from an airplane to a cannon. What have you?—S. K. Creel, Parkersburg, W. Va.

DAVIS-BOURNONVILLE Oxy-Acetylene welding and burning outfits, also some good torches. Will swap them for a good lightplane engine in good condition such as the Heath B-4, Aeronca or others. Write at once and state what you have to trade. Also have Rajah Racing Head for Ford "T" and a 1-cylinder Caille outboard motor that I will swap.—Chas. J. Lackey, 1143 Cherry St., Pottstown, Pa.

PHOTOGRAPHS — PICTURES

PHOTOS. Will swap photos of modern and World War Planes.—Robert Keppler, 909 Walnut St., Dover, Iowa.

PHOTOS. I have a number of photographs of modern planes, such as Frank Hawks' Texaco 13, Fokker and Ford trimotors, Lockheed Orion, Bellanca Pacemaker and many others. All pictures are No. 116 size.—Andy Beauseau, Box 361, Van Vleck, Texas.

PHOTOS. Have photographs of many modern military and commercial type planes for trade. Would like to get a German Iron Cross in trade for some of my photos.—Fred Bamberger, 817 West End Ave., New York, N. Y.

NEGATIVES of modern and early planes wanted. Will trade two or more good prints for every good negative that I receive in good condition. Send lists.—Walter E. Frisbie, Jr., 333 Sherman Ave., New Haven, Conn.

SCRAP BOOK with about 260 airplane pictures. Will swap for model plans or three issues of POPULAR AVIATION.—Eugene Secquist, 2239 Commonwealth Ave., St. Paul, Minn.

PICTURES WANTED. I want all sorts of pictures dealing with aviation, recent military planes, racers, transports, lightplanes and freaks.—L. W. Fisk, 143 Sylvan Ave., West Hartford, Conn.

Honeymooners

THE "Bill and Coo Special," an air passenger line to Niagara Falls for honeymooners, has been in operation since last summer. It is an extension of the Martz Air Lines' New York-to-Buffalo service, and has been enjoying excellent patronage. The service is not restricted to honeymooners, but they receive special consideration and reduced rates.

Model Contest

(*Continued from page 244*)

SECOND PRIZE. A replica of the Sikorsky by N. Strohmeyer, Chicago, took the second prize in this division, although it was a close "runner-up" to the first prize winner.

The Sikorsky was accurately constructed and beautifully finished and completely detailed. From the standpoint of a paint job alone, it was easily the first in its class for Mr. Strohmeyer had painstakingly doped the hull with no less than 38 coats of dope and the wings with 26 coats.

* * *

THIRD PRIZE. Austin B. Croshere, Jr., New Bradford, Mass., carried away the third prize in the non-flying scale division to the perfect satisfaction of all. This was a beautifully executed skeleton model of the Boeing P-12-B that showed every structural detail for the covering had been omitted. It was an exquisite piece of work, and because of the exceedingly small pieces used in the framework, it had a dainty point-lace effect that drew the admiration of the crowd. Mr. Croshere states that this model contains approximately 1,400 pieces, and while we did not count them, it gave the impression that the count would be nearer to 10,000. It was built entirely from raw materials.

* * *

CLASS (3). FLYING-STICK MODEL DIVISION

FIRST PRIZE. The first prize in the flying stick division went to Lawrence Phillips, Tulsa, Okla. It had a wing span of 24 inches and weighed 1.32 ounces. Its possible flight duration, based upon the propeller run is 162 seconds.

It was exceedingly well made, and while it had not been thoroughly tested, because its maker did not care to take the chance of crashing it, it gave every evidence of good flight ability. Mr. Phillips states that this is the first of a series of speed models that he is about to build.

* * *

SECOND PRIZE. George Mackie, Chicago, Ill., took second place in the flying-stick division with his twin-pusher seaplane—a very excellent piece of work.

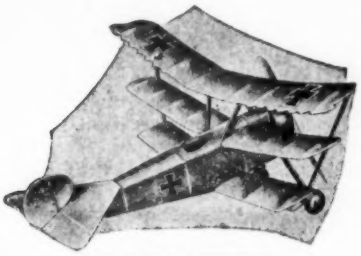
He says that it is a R. O. W. type, rising from the water in a very few feet and then giving a very good distance and duration. During one flight, it rose off the water and flew for three minutes and 12 seconds, flying about 7/8 mile and attaining a height of 150 feet.

* * *

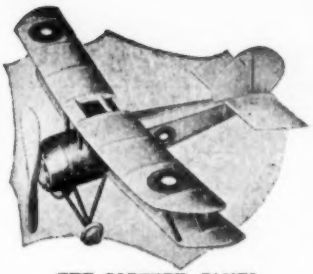
THIRD PRIZE. Roger F. Parkhill, Minneapolis, Minn., submitted a unique type of model which he calls the "Flying Cellule." It is a biplane model that can be used either as a pusher or tractor and the rubber is enclosed with a half inch tube made by rolling up sheet balsa.

(*Concluded on page 254*)

Pick Yours from these Six Flying Scale Models



THE FOKKER TRIPLANE
12-in. Span



THE SOPWITH CAMEL
12-in. Span

THE BOEING FIGHTER 12-in. Span

Compare These Kits with Others costing more!

Guaranteed to Fly!

Complete Kits 12 in. Size

25c Each

SEE COUPON

These new "IDEAL-O-PLANE" Models have made a decided hit; everybody is building and flying them. And no wonder! They are the finest you ever saw, the equal in appearance, and detail of Models costing two and three times as much. Look at these pictures, everyone an actual photograph of a Model made with these Kits. These are **Flying Scale Models** with full fuselage bodies, cambered wings, shock-proof landing gear, carved balsa propellers and other features of high-priced Models. Everyone has lots of detail designed right into the Model so you can reproduce it easily and accurately. Our Engineers have been working for months to develop these extraordinary flyers, and now you can build and fly a whole fleet for what one good Model formerly cost.

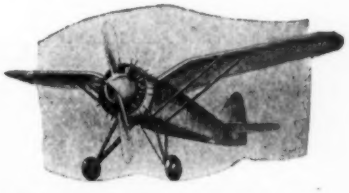
The air performance of these 12-inch Models is simply wonderful. The duration flights you can get will astonish you, and we guarantee every Model to fly when correctly built according to instructions. They weigh only ¼ oz. each and have loads of power.

You can build several of these Models in less time than it would take to build only one more complicated Model. Of course, the details require careful workmanship, but every Kit is so complete, and all parts so carefully finished, that building is a real pleasure. You'll save a lot of time by building two or three at once; you can work on one while another is drying. We are putting out these Kits by the thousands, and such large-scale production allows us to finish them more completely and still sell them for the very low price of 25 cents each. (See Coupon).

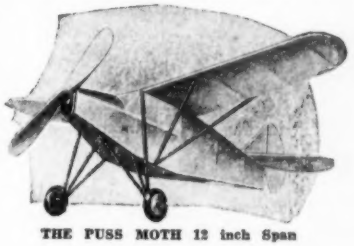
THE FOKKER D-VIII 12 inch Span

Here's What You Get in Every Kit for 25 cents

First, the Plan: a big, 12½x 13½ in. sheet printed on heavy paper showing full-size of side, top and front elevation, with every operation shown in clear detail and explained by instruction notes; also directions for finishing the propeller. Insignia markings are included on this sheet; just cut them out and glue in place. The wing ribs, fuselage formers, wing top, bulkheads, landing gear struts, and other parts are printed on sheet of balsa ready to be cut out. Two big sheets of colored Jap Tissue are included for covering fuselage, wings and tail assembly. Other materials are: 12 balsa strips for spars, longerons and such parts; 3 bamboo strips for reenforcing; ¼ inch rubber for motor; 1 bottle cement; 2 hardwood wheels, ¾ in. size; 1 propeller shaft; 2 washers; 1 rear rubber hook; 1 machine carved balsa propeller ready for sanding and finishing. Every Kit is complete with everything required to make the finished Model. Compare the contents with others which cost much more and you'll realize what wonderful value these Kits are for only 25 cents each. (See Coupon).



THE POLISH FIGHTER 12 inch Span



THE PUSS MOTH 12 inch Span

Here's your chance to get the jump on the other fellow. Build a couple of these "IDEAL-O-PLANE" Models and you'll have them all doing the same when they see them. Look them over here and send your order along right away. Our big-scale production enables us to secure very low prices on materials, and we are passing this savings along to you. We cannot however, fill orders for less than two (2) Kits because the packing and postage charges are too much. So send your order for two or more Kits at one time. Then the price is 25 cents straight for each Kit, and we prepay all postage charges right to your door.

Send the coupon right away and get started on your Models at once

Have You an IDEAL Bulletin?

Every Model builder should have this fine Bulletin. Illustrates and describes New IDEAL Models and lists hundreds of accessories, parts and supplies every builder needs all the time. Send 2c stamp for your copy now.

IDEAL AEROPLANE & SUPPLY COMPANY, Inc.
22-26 West 19th Street, New York

Canadia Model Aircraft, 47 Hawarden St., Montreal
(Canadian Prices are Higher to Cover Customs Duty)
DEALERS: Write for Details and Discounts.

Ideal Aeroplane & Supply Company, Inc.,
22-26 West 19th Street, New York.
Enclosed find $.....(No Stamps, please; Cash in Registered Letter, Money Order or Check) for which please send me the items checked below:
"IDEAL-O-PLANE" 12 in. Flying Model Kits
.....Boeing Fighter Kit .....Sopwith Camel Kit
.....Polish Fighter Kit .....Fokker TriPlane Kit
.....Fokker D-VIII Kit .....Puss Moth Kit
(Kits are 2 for 50c; 3 for 75c; 4 for $1.00; all 6 for $1.50. We pay all packing and postage charges. No orders accepted for less than two (2) Kits. Check the Kits you want in the list above and mail this coupon at once.)
.....Enclosed find 2c stamp for New IDEAL Bulletin
Name.....
Address.....

Model Contest

(*Continued from page 252*)

This model has a wing span of 24 inches and a length of 33¼ inches. The gap between the upper and lower wings of the cellule is 5 inches and a decalage of 3 degrees is built into the wings for stability.

* * *

CLASS (4). FREAK MODEL DIVISION

FIRST PRIZE. In the very interesting freak division, the first prize was given to J. R. Purvis, 18 Gamble Ave., Toronto, Canada, for his highly interesting wing-flapper or ornithopter. And while it was far from being ornamental, its outstanding freakishness and its ability to navigate won it first place in a large collection of freakish freaks. It really did fly well at the exhibition and it was highly interesting to many of our visitors who probably had never heard of an ornithopter before.

This model was the result of long experimental work started in 1930 by Mr. Purvis. A number of wing-flappers were constructed before consistent success was attained. He says that after all this experience, observations of pigeons make him believe that these birds have some means for supporting themselves in addition to wing-flapping. A pigeon weighing eight ounces, for example, flaps his wings quite leisurely while an eight ounce model airplane with as little power as the pigeon would only be a joke.

The model in the contest was rubber driven with a crankshaft beneath the wings. Rods running from the rotating cranks gave the wings a peculiar motion that sustained the model and at the same time drove it forward. Good work, Purvis!

* * *

SECOND PRIZE. Much attention was paid to the twin autogiro submitted by Willard Ewing, 6449 Parnell Ave., Chicago, Ill. A double fuselage was constructed with a rotor over each fuselage and is so constructed that the rotors revolve independently of the two front motors. This model rises from the ground quickly and almost vertically, and at the finish of the flight settles vertically to the ground.

* * *

THIRD PRIZE. Edward Krayem, Parks Air College, E. St. Louis, Ill., provided the biggest model in the show. This is a nine foot model of a Curtiss Hawk driven by an eight cylinder radial compressed air motor. The motor develops about one-quarter horsepower when the tank is charged to its maximum capacity of 125 pounds per square inch. It weighs 52 ounces of which 24 ounces comprise the weight of the powerplant.

END

Solid Models

45c 45c

6 to 8" Scale Models of ten famous planes!

Pfalz Scout, No. AC-1	S. E. 5, No. AC-2
Rumpler, No. AC-3	Nieuport, No. AC-4
Camel, No. AC-5	S.P.A.D., No. AC-6
Travelair Mys., No. AC-7	A-8 Attack, No. AC-8
Boeing P-12C, No. AC-9	Akron Fighter, No. AC-10

A-8 Attack 8" Wingspan

BUILT ENTIRELY FROM KIT No. AC-8

Kits are absolutely complete in every detail. Stamped fuselage, printed parts, insignias, etc.

10 wonderful models to select from

Only 45c each P.P. ANY 3 for $1.10 P. P.

Flying Models

10" Baby R. O. G.	25c.	P.P.
11" Comet Flyer	30c	P.P.
12" Army Hawk	40c	P.P.
18" Robin	1.00	P.P.
20" S. E. 5	1.75	P.P.
40" Twin Pusher	1.45	P.P.

FREE!

With every order for 50c or more you may select one of the following complete plans.

40" Twin Pusher 12" Hawk
24" S.P.A.D. 24" Falcon

Send 3c stamp for our list of

ARIELCRAFT MODEL SUPPLIES

118 Different items to choose from for your next contest model.

ARIEL MODEL PLANES

622 Hegney Place Dept. A New York City

AERONAUTICAL ENGINEERING

Aircraft Design, Stress Analysis, Airport Engineering, Air Transportation, Engine Design, Ground School, Mechanics, and Flying Courses. Send today for "The Key to Opportunity in Aviation." It's Free.

U. S. AIRCRAFT ENGINEERING SCHOOL, Inc.
1732 Grand Ave., Dept. I, Kansas City, Mo.

15c

CABIN PLANE JR.

A 12" flying model for beginners. Will take off and outfly many higher priced planes. Kit complete with full size plans, balsa and bamboo strips, Japanese tissue, cement, etc., 15c Plus 3c postage. 2 KITS SENT FOR 30c p.p. Remit by money order or 3c stamps. Send for FREE PRICE LIST. DEALERS:—Send for quantity price list on Kits and Supplies.

G. H. Q. MODEL AIRPLANE & SUPPLY CO.
626 Jackson Ave., Bronx, N. Y.

Forest Patrol

(*Continued from page 218*)

the Prairie Provinces 75,000,000 acres are regularly patrolled by aircraft. Twenty-four machines specially adapted to forestry requirements are operating for this service. These machines take to the air in March and maintain a patrol until late fall.

IN THE United States, airplanes have not been limited to patrol only. The airplane as a vehicle of transportation in forest regions has met with widespread approval. Transportation has and always will be one of the greatest problems confronting the Forest Service. The airplane has two distinct advantages over ground methods of transportation. It is faster, and can fly direct to the location needing men and supplies.

Many regions can be reached only by pack horse. When a fire breaks out in these areas it may be days or even weeks before fire fighters and equipment can be transported to the location. In most cases a few men can put out a fire if it is intercepted at once. The airplane offers this opportunity.

It is already a matter of record that the airplane has economically and efficiently transported hundreds of men and thousands of pounds of supplies and equipment into remote districts. In Region I, constituting much of the forests of the Pacific Northwest, 130,000 pounds of supplies in addition to 100 men were transported by airplane during the summer of 1931. This equipment and men were transported at a cost much less than could have been realized by ground methods. The Mamer Air Transport delivered 56 men to a ranger fighting a fire in the Clearwater wilderness between daylight and ten A. M. The round trip was in the neighborhood of 400 miles.

It would have taken several days to get these men into the region by motor car and horse-back. In this particular forest more than 100 men were transported by plane following a lightning storm which had started twelve fires. At another fire, a cargo plane delivered five water pumps, 36 large saws, 36 shovels, and 36 axes. The plane flew low and dropped the equipment on a spot marked with a white canvas. Only two saws and six handles were damaged by the fall. The equipment, of course, was well packed for the drop.

In the Selway forest of Region I, a landing field has been constructed that is 3,000 feet long and 200 feet wide. It formerly took two days to get supplies into this forest by pack-horse. Now tri-motored planes carry 2,500 pounds of freight in at a trip. Five such fields have been constructed in the forests of the Northwest. One of these is located in the Chamberlain Basin, central Idaho.

The field is at an altitude of 6,000 feet. The basin area embraces about

(*Concluded on page 256*)

NEW! SELLEY'S LOW PRICE POLICY STARTLES THE "MODEL" WORLD!

BOYS! Now Build and Fly Selley's Finest Quality Models at Prices You'd Pay for Ordinary, Commonplace Kits.

Selly has always built and introduced the finest construction sets money can buy! And now Selley presents these stunning low-price models that were created with the same care and attention given to much higher priced kits. These beautiful, speedy, long-distance flyers are fast becoming the most popular planes in the Selley line! And no wonder! They are all beautifully designed, realistic in appearance, accurate in detail and assure amazing flying performance. Everywhere boys are talking of these new Selley sensations. And you will too, when you see what wonderful bargains these kits are at these ridiculously low prices! Try them! Test them! Compare them! Selley endorses every one with a bonafide money-back guarantee! Make your choice RIGHT NOW!

FAIRCHILD

"A dandy flier"

SPECIAL! SIX MODELS AT COST OF MANUFACTURE!

Curtiss Navy Racer
Buhl-Bull Pup
Verville Air Coach
Aeronca
Heath Parasol
Fairchild
All 14" Wing Span
Plans 10c
Postage and packing 10c
West of Mississippi 20c

25c ea

To familiarize boys with Selley's superior construction sets, we offer six snappy models at the cost of manufacture. think of it! Here's your chance to get acquainted with Selley value for a trifle. Every kit complete with all materials, parts and full sized plan for the building of a perfect replica model! Your friendship is our aim—your future patronage our reward. Order a fleet of these flyers NOW!

BUHL BULL PUP

Speed and distance, too.

Selley's Standard Supplies at Lowest Prices Ever!

SPUN ALUMINUM COWLS

Diameter	Anti-Drag	Open Cowl	Closed Cowl
1¼"	.20	.20	.20
2"	.25	.25	.25
2⅛"	.28	.30	.30
3"	.30	.35	.35
3⅛"	.40	.45	.45
4"	.50	.55	.55

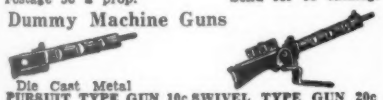
Cowls made in 4½, 5, 5½, 6, 7, 8, 9, and 10" diameters. Packing and Postage, 6c each.

PROPELLERS

	3¼". .25	Propellers can	3¼". .20		
4"	.35 4"	.30	4"	.25 4"	.30
4½"	.45 4½"	.35 be had in the	4½"	.25 4¼"	.40
5"	.50 5"	.35 following sizes	5"	.30 5"	.45
5⅝"	.60 5⅝"	.40 7, 8, 9, 10,	5½"	.35 6"	.60
Alumin	6¼". .40		6½". .45	Alumin	
6¼".	.70 Alumin	11, 12, 15, 18	Alumin		
7"	.80 7"	.55 21, 24".	6¾". .50 7"		.70

Postage 3c a prop. Send for 5c catalog.

Dummy Machine Guns



Die Cast Metal
PURSUIT TYPE GUN 10c SWIVEL TYPE GUN 20c
Postage, 3c each

NOW SELLEY WHEELS COST LESS

The largest and lowest-priced selection in the world

Aluminum Disc Rubber Tires	
½" dia.	5c ea.
⅝" dia.	6c ea.
¾" dia.	7c ea.
⅞" dia.	8c ea.
1" dia.	9c ea.
1⅛" dia.	10c ea.
1¼" dia.	11c ea.

Balloon Tire Alum. Disc	
1½" dia.	25c pr.
1¾" dia.	30c pr.
2" dia.	40c pr.

Aluminum Disc Rubber Tired Air Wheels	
1" dia.	18c pr.
1¼" dia.	20c pr.
1½" dia.	25c pr.
Treaded Rubber Aluminum Disc 1 3/16" dia.	30c pr.
1½" dia.	40c pr.
2" dia.	50c pr.
3" dia.	60c pr.
5⅜" dia.	$1.25 pr.

Balsa Wheels Balloon Tire Shape	
½"	5c pr.
¾"	6c pr.
1"	7c pr.
1¼"	8c pr.
1⅞"	15c pr.

Celluloid Untired	
¾" dia.	6c pr.
1" dia.	8c pr.
1⅜" dia.	10c pr.
1⅞" dia.	16c pr.
3" dia.	40c pr

Celluloid Pants	
¾" or 1" Whl.	25c pr.
⅜" or 1⅞" Whl.	30c pr.

Celluloid Air Wheels	
¾" dia.	8c pr.
1" dia.	10c pr.

Bal. Tired Cel. Disc Whl.	
1½" dia.	30c pr.
1¾" dia.	35c pr.
2" dia.	45c pr.

Postage on Rubber Tired Wheels 4c; Untired, 3c pr.

Captain Mollison's **PUSS MOTH** *The Heart's Content*

Postage 20c

75c

Plans Sold Separately 15c

This faithfully reproduced FLYING SCALE Model with its 18" wingspan, bright green fuselage and yellow wings is a "beauty." This Selley Kit comes complete with all parts printed on balsa wood, special fittings, rubber cement, colored paper and full size plan, with detailed building instructions. Send for it NOW!

BIGGEST VALUES IN SELLEY'S HISTORY. HERE'S WHY!

These models introduce a new development in model building. Another new SELLEY idea. Our original Bi-form method of fuselage construction only used on these SELLEY models. This new method simplifies the construction so that it is now possible to build the most intricate designed fuselage into a perfectly formed body. These sensationally priced SELLEY models are beautifully designed, realistic in detail and assure amazing flying performance. Here, truly is the BIGGEST VALUE ever offered in authentic Scale Flying Models.

All 18" Wing Span **ALL 95** Postage

Every model is packed in a separate box, labeled and sealed and comes complete with full size 3-view plan, layout sheet with all details clearly shown, special machine turned balsa cowls, prop, hub, wheels. Printed balsa rib and bulkhead sheet, colored tissue, cement, music wire, rubber reed, bamboo, printed motor dashboard, insignia sheet and best grade balsa size sticks. What a value!

ATTENTION DEALERS!

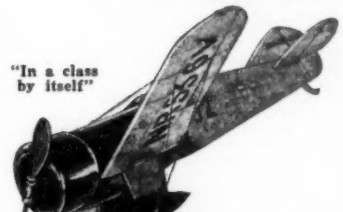
Cash in on this remarkable range of new SELLEY kits. The only complete range of model airplane accessories in the world. Write for discounts. Prompt delivery.

BOEING "Talk about class"

"A Sure Contest Winner"

A-8 Attack

"In a class by itself"



WEDELL-WILLIAMS

"Amazing performance"

GEE-BEE SPORTSTER

Send for Airplane Catalogue. Send 5c for Boat Catalogue. "You can buy in Confidence from Selley"

SELLEY MANUFACTURING COMPANY

1373-P GATES AVE. BROOKLYN. N.Y.

• DON'T •

MIND THE SMALL TYPE

LOOK At The Drastic Reductions All Regular Merchandise **This Month-ONLY**

A Bargain in Every Line

NO SECONDS—NO WAR SURPLUS—NO DISCONTINUED STOCK

HELMETS

Twill cloth passenger or souvenir type 39c. **Gabardine**, White, Ecru, $4.50. Red herringbone, pockets for ear puffs, 79c; 3 for $2.30.

Black leather fleece lined (no goggle straps), $1.79 each.

Select grade **Cape leather**, Black or Tan (unlined), $2.39; 3 for $7.00.

Extra Quality **Cape Skin** Chamois lined, Black or Tan (sewn in ear puffs), $3.19; 3 for $9.25.

• GOGGLES—*NON-SHATTERABLE •

*D.E.M. Wide Sponge Mask vision, Reg. $11.00 now $5.95
*D. E. V. Wide vision, Reg. $ 9.00 now $5.45
*D. E. K. Wide vision, Reg. $ 8.00 now $4.95
*D. E. C. Wide vision, Reg. $ 9.00 now $5.45
*N. M. R. Sponge Rubber mask, Reg. $ 7.00 now $4.95
*R. A. V. Rubber binding, Reg. $ 6.00 now $3.98
*N. A. K. Silk binding, Reg. $ 5.00 now $2.98
*D. G. Chenile bound..... Reg. $ 6.00 now $3.98
*W. Y. D M. Rubber mask, Reg. $ 4.00 now $2.75
*W. Y. D. Rubber mask, Reg. $ 3.50 now $2.39

LUXOR U. S. AIR SERVICE—No. 7
Reg. $13.75..... $10.95

• $10.00 FLYING SUITS—NOW $4.89 •

Lee "WHIZIT" White Zipper
Map pockets, belt, snap wrist and ankles.

• LOG BOOKS •

LEATHER Reg. $1.00, Now 69c; $1.25 grade with Aero Insignia 79c.

Soft **paper cover**, large size 19c (pilot).

Engine dog same size, 19c. Aircraft log, 39c.

Glider pilot log paper cover, 15c, cloth bound, 22c

Student progress report with duplicate pages for record 15c.

Daily flight record cards 20c per dozen.

• MAPS •

RAND McNALLY AIR TRAILS, State maps.....39c each

• INSTRUMENTS •

CLOCK, Pioneer 8 day luminous, $9.45.

Compass Jones, Compensating, Bracket style (lighted), $6.95. Unlighted, $5.95.

Pocket style (Boy Scout model) good for hunters or fishermen, $1.95.

Foxboro Oil Gauges, 0-100 lbs. luminous, $2.95.

Bank Indicator, bubble type, $1.89, tells position of plane laterally or horizontally.

Inclinometer, 40 degrees, climb or dive, Reiker Instrument Co., $20.00 model $9.95.

Altimeters "Zenith" luminous $5.45 20,000 ft.

Air speed indicator (strut type) Johnson make, $7.45.

• JEWELRY •

WING EMBLEM for coat lapel, 39c. 3 for $1.10.

Aviation rings, mens size, sterling, $2.00; Ladies, $1.50.

Wristlets Sterling, $2.50; Gold filled, $5.00; Green gold filled, $6.00.

Ready sewn **fuselage covers** for Bird, Curtiss Robin, Great Lakes and Travelair, $21.00.

CLUB Orders of over $50.00—DEDUCT—TEN PER CENT

Mention Size when ordering

Send Cash or M O. Avoid C.O.D Charges. We do no issue Catalogs.

SMOOKLER Dept. 37 489 Fifth Ave. New York City

Phone—Vanderbuilt 3-9673

Forestry Planes

(*Continued from page* 254)

500,000 acres and is the home of the largest herds of mountain sheep, mountain goat, elk, deer, and bear in the United States. This game, too, needs protection.

THE scouting plane has been found useful in mapping insect infected areas. A complete, detailed survey was made of Yellowstone National Park last summer to map out the areas infested with bark beetle. All of the "bug" infested areas were mapped in a few days. The ground crews were greatly aided by the maps made by the airmen.

On the Island of Oahu, Hawaiian Islands, 700 acres of burned over forest were seeded back to timber. The seed was reported well distributed, but no official report on the project has yet been published.

The Forest Service makes use of aerial photographs. More than 600 square miles of national forest have been photographed on a scale of six inches to the mile. If growing in the open, coniferous trees six to eight feet in height, are plainly visible in a good photograph taken from 10,000 feet. Sixty or more such square miles can be photographed in a day.

In extensive areas, poorly mapped and but little explored, valuable data can be quickly secured by a skilled observer sketching details from an airplane. In Burma, during 1925, an extensive cover map of 15,000 square miles of tropical forest was made by sketching in types on a 1 inch to the mile base. The project was a great success.

The value of the airman in checking insect damages to timber was clearly demonstrated by a project in checking hemlock looper (Ellopia fiscellaria) in Pacific county, Washington, last summer. A study was made in the Fall of 1930 and revealed a serious outbreak of this insect. Quite often hemlock looper appears periodically in epidemic form. Such epidemics of this parasite resulted in Oregon losing 500,000,000 feet of standing timber during 1920. In 1930 about 32,000 acres of Washington's timber was affected by this insect.

Governor Ronald H. Hartley cooperated with private interests and sponsored a program to have 6,000 acres of the best timber dusted with calcium arsenate by airplane. The contract was awarded to the Northwest Air Service of Seattle.

THE mechanics of the operation are interesting. The company reconstructed a Ryan monoplane powered with a 300 H. P. Wright engine. The plane carried a useful load of 1,000 pounds. A hopper was constructed of automobile steel and installed having a loading entrance coming through the top of the wing, fitted with a hinged cover and an outlet controlled by a slide valve in the base of the fuselage.

Two agitators were installed in the hopper driven by a battery-powered motor. One agitator was set immediately over the valve opening, the other was set in the upper, rear section of the hopper. The agitators were connected with a roller chain.

A lever controlling the opening valve was installed at the right side of the cockpit. On this lever was a single-throw switch by which the agitators were operated. This provided for an effective control.

It is not easy to visualize the difficulty encountered in work of this kind. The contract specified that no dusting was to be done lower than 40 feet above the tree tops. The dust at the rate of 20 pounds per acre was to be laid down in strips 140 feet apart. The 1,000 pound load was sufficient to dust about 50 acres.

END.

Reserve Corps

(*Continued from page* 224)

take advantage of this valuable training, however, some reserve officers have been fortunate enough under some circumstances.

THE author remained on active duty for a period of sixteen months, and never received an opportunity to participate in maneuvers of any sort, nor did he receive an opportunity to avail himself of an extended cross-country which is so valuable to the military flyer. The most valuable flying training received, in my estimation, was on an extended cross-country on which I accompanied a senior officer. Various weather conditions were encountered resulting in forced landings.

I remained in uniform throughout the trip and worked as if detached for that service. Upon my arrival at my home station, I found that I was on leave of absence. Incidentally, I accompanied this senior officer on this trip for the expressed purpose of receiving training on the Ford tri-motor which we used, and to become more experienced in cross-country flying.

The limited time an officer spends in training and on active duty is not suffi-

AERONAUTICAL ENGINEERING

B.S. Degree in 2 years

For ambitious earnest students—the Tri-State College course in Aeronautical Engineering, 108 weeks. Bachelor of Science degree. Graduates in Mechanical Engineering can complete aeronautical course in 2 terms (24 weeks). Thorough training in all fundamental engineering subjects. Non-essentials eliminated. Courses designed to save student time and money. Flying school facilities available at nearby airports. Enter September, January, March, June. Courses are offered also in Civil, Electrical, Mechanical, Chemical Engineering, Business Administration and Accounting. Living costs and tuition low. Those who lack high school may make up work. Students from 48 states of the Union and 45 foreign countries. Graduates successful.

743 College Ave. Angola, Ind.

Properly trained engineers in design, research, manufacture and sales work are in demand

TRI-STATE COLLEGE

cient to enable him to run up a sufficient number of flying hours to secure a profitable commercial position. Why train a man for electrical engineering if he is going to be a lineman? That is a practical question. Then why train a man to fly if he is going to practice another profession after the completion of his training? At the present time, it is practically an impossibility to secure a flying position; yet three times a year, a class of graduate reserve officers are reverting to inactive status, figuratively speaking—to fold their wings and scratch on the ground.

It has been admitted by high officials that the U. S. Army Air Corps ranks about fourth or fifth in proportion to numbers, using the proportion of combat planes that we have in comparison with other nations. Not only are we short of planes, but we are also short of personnel and yet there is no room for the flyers on whom the U. S. Government has spent thousands of dollars to train. There are trained reserve officers on inactive status, desirous of regular commissions in the Air Corps, who will never be able to receive their commissions which they so justly deserve, due to the fact that they are being reserved for men who are not yet through their course at West Point.

With all due respect to the high efficiency of our government, the people of our nation should be chagrined to know some of the principles exercised in some of its departments. Does it seem sound and logical to train a man for one profession, say law, then at the completion of his college course, send him to a medical school? That is exactly what the officials of our government are practicing.

At the present time, the U. S. Government makes appointments from civilian life to qualified candidates to attend West Point, where they receive a standard four-year college course and specialize in one branch of the Army, of which it may be any branch with the exception of the Air Corps. At the completion of their course of study there they are commissioned 2nd Lieutenants in the U. S. Army.

For the past few years, without exception, the greater number of these graduates make application to attend the flying school at Randolph Field, and with all sincerity and good purpose, a great number transfer to that branch, from the branch previously trained. Those failing to complete this training, incidentally a great number, may revert back to their respective branches and as you and I would say, it is a "cinch."

IT WOULD be useless for me to advocate a change which many men more powerful in influence have advocated for some time, with no results. But it does seem that the able-minded Congressmen whom we have elected recently can and will make a change in the governmental departments which are the source of the trouble. Why not

(*Continued on next page*)

50 million miles of air-experience

—*the preparation for a Boeing School Student's first solo*

AVIATION has come of age—from now on applied *experience* must guide the training of its career pilots, mechanics and executives.

The unequalled breadth of experience developed by United Aircraft & Transport Corporation—world's largest aviation organization—is the basis of your training at the Boeing School.

Fifty million miles of United Air Lines air mail and passenger transportation; more than one million miles of Boeing School student flying; the research and manufacturing successes of Sikorsky, Chance Vought, Stearman, Hamilton, Pratt & Whitney, and the Boeing Airplane Company—these, combined, make the contribution that *only the Boeing School* can give to your future in aviation!

Air mail-pilot instructors, location at a key terminal of United Air Lines, a modern laboratory and school building, and the most complete ground-school instruction at any flying school in this country are additional advantages.

To make your own comparison of Boeing training with any other, mail the coupon below for the new Bulletin. Or, better still, ask any person who has been a student here.

THE REDUCED PRICES APPLY ON *ALL* FLYING COURSES
Next regular enrollment, April 3

BOEING

SCHOOL OF AERONAUTICS

Subsidiary of United Aircraft & Transport Corp.

BOEING SCHOOL OF AERONAUTICS
Room R-4, Airport, Oakland, California

Gentlemen: I am interested in

☐ Boeing Master Pilot ☐ Boeing Master Mechanic
☐ Transport Pilot ☐ Special Master Pilot
☐ Limited Commercial Pilot (*Open to holders of Transport Licenses*)
☐ Private Pilot

Name_____ Age_____

Address_____

City_____ State_____

A Whole Lot of Model

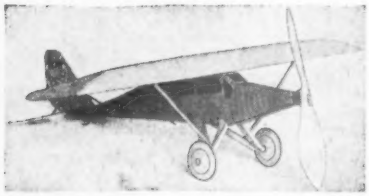
—for only One Buck!

The 22 inch AIR-CHIEF is the king of the built-up fuselage models! It's easy and quick to build, is stable—and how she flies! It is not a scale model of a commercial ship but is a real model built for performance. Try it—you'll be amazed.

The Air-Chief Kit—Complete.....$1.00

ACME MODEL SERVICE
6227 Byron Street Chicago, Ill.

AN ALL-METAL FLYING MODEL!



Span 16", Weight 1 oz. Be Modern! Build a VELIA-CRAFT "Silver Flash" that has speed, snappy lines and super performance. For the first time in Model Aircraft history you can now build a model that looks, flies and is constructed of the same material as big ships. There's no wood, paper or dope used in the "Silver Flash", it's ALL METAL! This beautiful model is easily built in a short time and is an exceptionally stable flier. The kit, complete in every detail, contains all the metal parts, special cement and comprehensive illustrated instructions.

55c POSTPAID

Remit by check or Money Order. Foreign and Canadian orders 65c.

VELIA-CRAFT 1518 Westwood Ave. LAKEWOOD, OHIO

HOWARD RACER

Span 15", weight 1 oz., Flying Scale model, special celluloid wheels with silverized discs, detail drawing, all materials. Flies 300 feet. Const. Set. $ .75 P. P.

CURTISS SUPER HAWK

24" Span, Weight 1½ oz. A sensational value flying scale model. Set includes celluloid wheels, wing and rudder, insignia, dope, glue, drawing, all materials. Flies over 600 feet. None other like it. Const. Set.....$1.00 P. P.

CURTISS PURSUIT XP. 934

18" Span, Weight 2¼ oz.

New 250 m. p. h. Curtiss Pursuit Set includes special metal exhaust pipes, wheel pants, spinner, aluminum pilots seat, insignia, detail drawing, all materials. Flies over 500 feet. Const. Set.....$1.25 P. P. **1933 Illustrated Catalogue on Special Supplies, Air and Gas Motors and Scale Models 10c**

Miniature Aircraft Corp.
83 LOW TERRACE, NEW BRIGHTON, N. Y.

separate the Air Corps from the jealous influence existing between Army and Navy General Staffs, and give it a chance to develop under its own initiative? Why not make appointments from civilian life to qualified candidates having a college education, and train them at Randolph Field; and upon their completion, commission them in the Air Corps? It alone, is the salvation of its growth, and development.

In reorganizing these governmental departments, which has been advocated by many men who are familiar with this work and who know the deficiencies that now exist; the Air Corps should be separate from the Army and Navy. Instead of the now existing Secretary of War and Secretary of Navy, there should be authorized by Congress a Secretary of National Defense with three sub-secretaries of the three departments, namely, Army, Navy and the Air Corps. In this way, they are all three kept under one common head, and yet each has its own administrative functions.

I am prone to recall the article which appeared in POPULAR AVIATION last May, titled "Feeding the Favorites," which no doubt you read. It is a disgrace to our nation to allow such to exist, and if the people of this country will get behind it by pressing the subject with their respective Congressmen, something will be done to remedy it.

No doubt there will be some radicals who are prejudiced to some of the things I have said and who will ask the question—"who are you to make such statements?"

For the benefit of those few, I am one of many seriously thinking men who has the Air Corps and the people of this nation at heart as well as my personal aspirations. I have not made any bold statements nor have I deviated from the truth.

The conditions are as stated, and any one who has been associated with them knows that I am not condemning any departmental principles, nor endeavoring to establish new ones. I have depicted some conditions as I know them to exist—small malfunctions are destined to exist in any organization. All is needed is a little correction by those who understand their deficiencies.—*Louis M. Gregory.*

END.

• 50 Text
AVIATION
Ground Course

FREE with all drafting courses

COLUMBIA SCHOOL
AIRCRAFT DRAFTING
AND ALL OTHER BRANCHES
By CORRESPONDENCE

Twenty-Second Successful Year

Write for Catalog. Address Dept. P.A. 333
1319 F St., N. W. WASHINGTON, D. C.

Capt. Christopher

(*Continued from page 222*)

airplane of which Captain Christopher was pilot, says that the acceleration of 10.5 g. caused Captain Christopher to suffer severely.

This fact led him to believe that the limits of the pilot's physical resistance to violent maneuvers was being approached, and that pilots when suffering so greatly would not impose greater accelerations on the airplane. Also, if pilots knew what was liable to happen to them as a result of such accelerations they would not be likely to impose them on themselves.

Captain Christopher was examined by an Army doctor after his spectacular pull-out. Briefly in the technical terms used by the doctor, "Captain Christopher showed a generalized conjunctivitis of both eyes—generalized systemic neurological symptoms leading me to think he had a mild cerebral concussion with some generalized cerebral capillary hemorrhage . . . "

In other words, there was an inflammation of the eyes, and a slight concussion of the brain. These, the doctors agreed, were results of the centrifugal force of dive pull outs. Captain Christopher fully recovered from this condition in about a month. It is no fun for a pilot to fly his plane so that he gives himself concussion of the brain. There are loop-the-loop records, endurance records, etc., but I guess we will have to hand Capt. Christopher the official record for the highest acceleration sustained by any pilot.

Obviously, this force not only affects the circulation but also places tremendous pressure on the flesh and bones.

However, many pilots have made turns steep enough to have gone black. Since this blindness is probably caused by blood draining away from the eyes and head, according to the author of one book on pilot training, "It (going blind) can therefore be delayed by tightening the diaphragm and neck muscles as when shouting very loudly and continuously." Then the author humorously adds, "this shouting incidentally adds a primitive zest to diving, and since it serves a useful purpose, is relieved of the suspicion of being entirely childish." Of course, to the benefit of the pilot, his voice can seldom be heard above the roar of the airplane engine anyhow.

In general, a passenger is more readily affected by high accelerations than is the pilot even though the passenger be an experienced pilot himself. To persons in good health no apparent injury results from moderately high accelerations, except that the inexperienced may have the temporary feeling of nausea. Because the physical structure of men is somewhat different than that of women, they can probably withstand accelerations better than women.

END.

$75 a Week for Dobbins!

My graduate, R. N. Dobbins, got a job immediately after finishing my course. Now he's earning $75 a week as Chief Instructor at a big Aviation School in New York!

Get on AVIATION'S PAYROLL!

Let Me Show You How to EARN $30 a Week and UP ... in AVIATION!

My up-to-date home study Course gives you the ground work you need to *get and keep a real job* in this fascinating, fast growing industry. Scores of my graduates, who didn't know a thing about Aviation a few months ago, are holding down fine jobs right now—in the air and on the ground. *Over forty different types of jobs to choose from,* once you have this necessary training. Get the facts about my practical training, free Employment Service and Money-Back Agreement NOW!

Walter Hinton

First to fly the Atlantic; first to fly to South America; first to explore the upper regions of the Amazon by plane. Flying Instructor in Navy for five years. Now giving ambitious men practical ground work training in Aviation at home. Mail the coupon below for your copy of his big new FREE Book today.

I Teach You QUICKLY— at Home in Your Spare Time

You don't need to give up your present job—don't need to leave home, to get your training in Aviation. I've made it easy for you. I've put my own fifteen years of experience—backed by over 400,000 miles of flying—five years of instructing in the Navy—all into my thorough, quickly mastered home study Course.

No Previous Experience Needed

You don't even need a high school education—don't have to know anything about planes or engines to learn the ground work of Aviation with my Course. Everything is clearly explained—illustrated by hundreds of pictures, drawings and charts—made as simple and easy as possible. You get all the information you need to pass the Government's written examinations for Mechanic's or Pilot's Licenses, in a few short months. If you want to learn to fly, I can save you many times the cost of my Course on your flying time at good airports all over the country.

FREE Airplane Ride!

Right now I'm making an offer of a free airplane ride to all of my students. Write me at once and I'll send you complete information. Act now—to get in on this fine offer—while it is still open!

I'll Help You Get a Job

My nation-wide Employment Department is at your service—the minute you are qualified to accept a job in Aviation. We are in touch with scores of airports, plane factories, etc., that want trained men. No extra charge to graduates for this extra service. Free Book tells all about how I help my graduates get the kind of jobs they want! Mail the coupon now.

There's No Time To Lose— Get My FREE Book NOW!

Aviation is growing by leaps and bounds—while many other industries are slumping. Don't wait and let the other fellows get ahead of you. Think about your own future. Let me prepare you for a job paying $30 a week or more—in Aviation. Get the FACTS. Mail the handy coupon on the right today—right now—while you're thinking about it. I'll send you my big new FREE Book—packed with interesting facts about your opportunities in Aviation. Mail coupon NOW.

WALTER HINTON, President
Aviation Institute of U. S. A., Inc.
1115 Connecticut Ave., Washington, D. C.

Mail for my big FREE BOOK on AVIATION NOW!

Walter Hinton, President, 836-A
Aviation Institute of U. S. A., Inc.
1115 Connecticut Avenue, Washington, D. C.

Please send me a Free copy of your book, "Wings of Opportunity," telling me about my opportunities in Aviation, how you will train me at home and help me get a job.

Name.....
(Print clearly)

Address..... Age.....

City..... State.....

Mill Importers of
MODEL AIRPLANE
JAPANESE TISSUE
PAPER
MADE IN 32 COLORS
WOOD VENEER
WHITFIELD PAPER
WORKS, INC.
16 Vestry St., New York City
Est. 1869

THE 22 INCH
DINGBAT SENIOR

A brand new Design—Something Different

It has no delicate parts. Simple, easy to build and will stand more abuse without cracking-up than any model you ever saw. It carries a lot of rubber and that means performance. It's a brand new idea—THAT WORKS!

Complete kit, and we mean complete 83c

ACME MODEL SERVICE
6227 Byron St. Chicago, Ill.

NEW LOW WING BOEING P-26 WONDER FLYER 20¼" Wing

Here's a peach of a new design. Perfect model, accurately scaled down from army's newest racing creation. Perfectly balanced for distance flights. NOT a paper fuselage — made of Balsa over shaped-bulkheads. Unusually durable. SO EASY TO BUILD! **$1.95** each! Or, 2 for $3.45! POSTPAID! Complete kit includes 9 cylinder celluloid motor, Turned Balsa wheels, Aluminum drag ring. Shaped motor mount. Shaped propeller blank. Cut-out pants, ready to be shaped. All wire parts, ready formed. 3-color insignias and tail strip. Glue. Colored army tissue. Can of genuine aircraft dope. With full size drawings.

COMING
Watch for announcement of new REDBIRD model, less than $1.00. Greatest model value, yet offered at a sensationally LOW PRICE!

FREE! With each kit, you get new 1933 catalog at no cost. Or, send 10c for catalog—2 pairs beautiful 3-color insignias included FREE. Learn how to earn your own Red Bird FREE. Send Today!

RED BIRD MODEL AIRPLANE AND SUPPLY CO.
1918 Emmett St. Omaha, Nebr.

Junior Ace

(*Continued from page 235*)

Second: the question no doubt arises in your mind as to whether or not you could build a successful sportplane and it is a question which is easy to answer with a YES. Anyone of average intelligence can build his own sportplane if he goes about it in the right way, however there are several things which must not be overlooked.

Do not try to design your own sportplane unless you have a thorough knowledge of aircraft design. Choose a proven design being sure that it has been actually built and tested. Then follow every detail of the plans for that ship—do not change one single thing. Do not substitute any materials for those shown on the plans.

Third: do not try to build your ship in one day. Take your time and make each part with care and accuracy regardless of how small it may be or how small a part you may think it has in the complete plane.

Fourth: only the best quality of materials are suitable for building lightplanes. All cheap substitutes are dangerous and more expensive in the long run. Pay particular attention to the quality of the raw materials such as the tubing, wood, fabric, dope and similar supplies and get them from reliable dealers.

The design of the Corben Junior Ace is the result of long experience and expensive experimenting. For this reason it is imperative that the exact dimensions and sizes of material are used as shown on the drawings and specifications.

(To be continued next month)

EDITOR'S NOTE. The first of the drawings will appear in the May issue of POPULAR AVIATION *and will be presented in blue-print form.*

Rotary Engines

(*Continued from page 238*)

rotary as this engine acts as its own flywheel.

In the first part of this article, the gyrostatic action of revolving motors was mentioned as being one of their faults. However, this characteristic was most noticeable in military planes, in which violent maneuvers were necessary, and where the motors were of relatively large diameter. On the other hand, a lightplane engine would have a smaller diameter and less weight. Then again, a lightplane is seldom called upon to perform the maneuvers of a fighting plane and its speed is relatively low.

It is no longer so difficult to properly lubricate rotary engines as in past years, and the rotary now consumes but little more oil than the radial type.

Only three cylinders would be necessary for a lightplane engine of the rotary type, which would simplify the problem of balancing the revolving parts. Likewise, the ignition and carburetion systems would be simpler and more fool-proof.

One of the most serious problems in air-cooled lightplane engine design is to obtain proper cooling. Ed Heath's greatest difficulty in his work with the Henderson engine was overheating in the rear cylinders. He finally overcame this fault after much work by lowering the compression in these cylinders, thereby reducing the temperature.

To achieve its greatest efficiency, a gasoline engine must be properly cooled. And another thing — if the cooling isn't uniform throughout, there's sure to be trouble from warping of the parts. Now, the higher the compression in an engine the greater the efficiency. But high compression is always accompanied by high temperatures and more cooling trouble.

However, high compression can be employed in a lightplane rotary engine because of its positive and uniform cooling. The cylinders, moving rapidly through the air, act as the arms of a blower, throwing the heated air off by centrifugal force. This is supplemented by the motion of the plane through the air and by the slipstream.

Thus, a uniform and rapid circulation takes place on all sides of the cylinders, eliminating distortion and enabling the parts to be made lighter.

Such a motor could be enclosed in an anti-drag ring or completely cowled in, with the exception of the lower part, without seriously hindering the cooling process.

The unreliability of the early rotary engines soon resulted in their abandonment by designers, but today they seem to have great possibilities as lightplane power-plants. It remains for some enterprising engine designer to experiment along this line, which may bring some gratifying results.

END.

LINCOLN Graduates Get the Best Jobs!

"$400 Per Month Since completing my training at the Lincoln School, I have been employed continuously as pilot, my salary is $400 a month. Lincoln trained pilots are preferred because of the character of training they receive."—C. L. Currier.

This is just one of many letters telling of the success of Lincoln graduates. This world's best known school is famous for turning out better trained pilots and mechanics. Our government licensed instructors know how to train YOU for the big pay jobs in aviation.

Come to LINCOLN and be sure of success! Government Approved School; internationally known. Unexcelled equipment and training that leads to quick advancement.

Now is the time to get ready for the big pay jobs that await properly trained pilots and mechanics. Exceptional opportunities for our graduates in Central and South America as well as in the U. S. Aviation courses taught in either English or Spanish.

Don't be fooled into wasting your money by "cheap" offers of training. "Cheap" training can only make "cheap" mechanics and pilots. Aviation wants only the best trained men —like those who have graduated from Lincoln and are now holding big pay jobs. Be sure of getting thorough practical training such as we offer you here at Lincoln where you work on actual airplanes and engines under real factory standards.

WRITE NOW for free catalog containing complete information about the Lincoln School and the big pay opportunities in Aviation. Be sure to state your age.

Lincoln Airplane & Flying School
232C Aircraft Building Lincoln, Nebraska

XUM

Spinning

(*Continued from page* 214)

power stalls where the pilot decides he will right about face suddenly and come back.

First, let's say the stall comes from too steep a climb at a height of about two hundred feet over the edge of the field. Since all turns out of a field are usually to the left or around the right hand side of the field, whichever way you want to put it, the pilot kicks left rudder and shoves the stick over to the left.

Down goes the left wing, already stalled and waiting for a feather to tip it over. Even if the stall was not complete on the left wing, it will be now because slamming the left wing down increased the angle of attack above the stalling point and the turn also slowed up the wing below flying speed.

With a complete stall, the conditions are ideal for starting a spin no matter whether the stall was intentional or accidental. Anything that will bring the speed down will cause the stall and there are a number of conditions that will give this result. And just remember that flying one wing low or steep banking cuts down the speed, and further, reduces the wing lift at the same time so that a steep bank will be a likely reason for a stall, just as when the climb is too steep.

The motor contributes to the trouble under some conditions while the lack of sufficient power will do the same thing. Insufficient power contributes to the trouble just as an excessively steep climb will do. You can pull yourself out of difficulties with a pursuit ship that would be impossible with a trainer.

We assumed that the motor is O. K. this time so of course the pilot has it wide open while trying to pull himself out of the hole. However, when he turns left, the gyroscopic force of the propeller tends to lift the nose still higher and the torque slaps the left wing down some more. All he needs now for a safe landing is a thousand feet more altitude and the wind blowing in exactly the opposite direction.

If the stall occurs due to a dead motor, the pilot will be on the same spot except for the gyroscopic action. Stoppage of the motor and the loss of flying speed, consequent thereto, will convert a nice safe conservative climbing angle into a stall and a spin in about one second if the pilot decides to try a turn.

A STALLED turn is pretty sure to result in a spin but straight stalls with a dive recovery, or "mushing down," can be accomplished with practice without spinning. After experiencing a spin, as above described, so that the student knows what to expect, he can learn a lot by stalling the ship and allowing it to flirt with the spinning idea.

The importance of this is to teach the student by the feel of the controls and the sense of flying speed, just how far he can stretch his glide in coming in for a landing without dropping the good old nose. With this object in mind, let's take some altitude again and try some stalls with and without power.

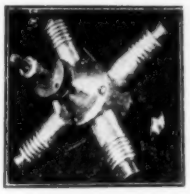
With the throttle at idling position, slowly pull the nose up and lose flying speed as though you were landing on an imaginary field up in the clouds. At the stall position the stick is clear back, all controls are sloppy and so is the ship. The idea now is to prevent the ship from going into a spin which means that you must keep the wings level with the horizon before and after the nose drops.

Leave the ailerons strictly alone unless it is a trick ship, for lowering the aileron to bring that wing up will bring the aileron angle of attack beyond the stalling point. The wing will then drop still further while the drag of the aileron will increase enormously as the angle is increased and smack you around and down.

Lay off the ailerons, but get busy with the rudder which is now your true friend. Just as it kicked you into a spin, when you wanted to go, it will now keep you out of a spin if you can only remember to kick the high wing and keep on kicking fast enough and the right amount.

Now, depending on how completely you stalled the ship and also on the stall characteristics of the ship itself, one of two things will happen. Either the nose will drop and you will dive if the stall was a good job or the ship will settle or "mush" with the nose

(*Continued on next page*)



4 Cyl. MODEL AIR MOTOR

1/12 H.P. at 1400 R.P.M., weight 2¾ oz., uses 14" to 16" prop. This 4 cylinder super charged air seal motor will fly real scale models 4" to 6" span, runs 1 minute on 100 lbs. pressure, vibrationless, very strong, all new features. Price ready to run $6.50 pp. Catalog 10c

Miniature Aircraft Corp.
83 Low Terrace
New Brighton, N. Y.

U. S. AIR CORPS

Takes in 600 men this year for FREE FLYING TRAINING. Gives them over 200 SOLO HOURS. Special Uniforms, Transportation to the Field, LIVING EXPENSES, and $75 a month while Learning. Real Flying Here. It costs absolutely nothing. Let Us Tell You How to Get In. Information about Uniforms, Rank, Leave, and Actual Life at the New $10,000,000 Field. Hand postman $1 and postage for entire information. Complete. Nothing else to buy.

FLYING INTELLIGENCE BUREAU
401 Judson T. Rives Bldg. Los Angeles, Calif.

KITS 15" Flying Scale Models

S. E. 5; Travelair Mystery Ship; Stinson monoplane; Lockheed Vega; Lockheed Orion; Gee Bee; Laird Supersolution; Curtiss Hawk P-6E; Curtiss HELL-Diver; Bellanca Skyrocket; Fokker Amphibian; Nieuport Scout; Boeing P-12B; D. H. Tiger Moth; Pfalz Pursuit; P. Z. L. VI; Supermarine 6B Gloster IV seaplane.....KITS 65c postpaid

Plans separate, 10c each, 3 for 25c

KITS 22" FLYING SCALE MODELS

Gee Bee; High Wing Pursuit Model B1; Fairchild "24" $1.00 postpaid

Plans separate, 10c each

CELLULOID WHEELS—MUSIC WIRE straightened
¾" per pair.....04c 36" lengths .014, .016,
1" per pair.....06c .020, .026, .032, .036,
1⅜" per pair.....08c 18 feet.....05c

ALUMINUM WHEELS 1" dia. Light as Celluloid Wheels, per pair.....08c

1-32x2x18 Balsa.....8 for 10c
1-16x2x18 Balsa.....7 for 10c
¼x2x18 Balsa.....6 for 10c
2 x4x18 Balsa.....25c
2 x6x18 Balsa.....40c
⅜x⅜x5 Balsa.....8 for 5c
⅛x⅜x6 Balsa.....7 for 5c

Grade A Tissue, Red, White; Blue, Green, Brown, Orange, Yellow, Black, 3 sheets, 10c,
1-32 sq. rubber, 75 ft. for 10c.
3-64 sq. rubber, 50 ft. for 10c.
3-32 flat rub., 40 ft. for 10c.
1-8 flat rubber, 35 ft. for 10c.

ALUMINUM COWLINGS

	open or closed face	Drag rings
1½" diameter	15c	15c
2" diameter	18c	18c
3" diameter	25c	25c

Add 15c for postage. Discount to Dealers and Clubs. Send 3c stamp for Price List.

DALLAIRE MODEL AIRCRAFT CO.
10140 Crocuslawn Avenue, Detroit, Michigan

O.K! said the U. S. Government, and the RHON RANGER was awarded.

APPROVED TYPE CERTIFICATE No. G-3

After months of exhaustive tests, covering every phase of design, construction, and airworthiness, this MOST POPULAR GLIDER, the time-tested

Rhön Ranger

passed every requirement of the most exacting aeronautical code in the world! As an example of the severity of these tests, a single rib, weighing less than 3½ ounces, carried 168 pounds . . . more than 7 5 0 times its own weight!

If YOU are planning to build a Glider, build it RIGHT. Take advantage of the famous MEAD line of Construction Kits, priced from $79.00 to $150.00 complete, or ask about our PAY AS YOU BUILD plan. You can start YOUR Rhon Ranger for as little as $12.50.

If you need aeronautical supplies of any kind, BE SURE to get our LATEST PRICE LIST. A dime brings you complete information about our products, the MEAD GLIDER Booklet, and other interesting items. WRITE TODAY to

MEAD GLIDERS
Dept. E-4 12 S. Market St. Chicago, Ill.

Good News for Our Readers

—in the May issue of P. A.

This is the Corben Junior Ace lightplane. It was built from the blue-prints that we will reproduce in the May issue and several subsequent issues. This is a real plane that gives outstanding service.

Spring is here at last!

WITH Spring comes the flying fever and a mighty ambition to get into the air at any cost, either by purchasing or building a plane. The flying bug bites deep, and with this in view, the editors of POPULAR AVIATION have made a real Springtime issue out of the May number. It will be filled with useful notes on amateur aviation, including the blue-prints of the Corben Junior Ace.

—but this is not all!

Then, for our "arm-chair pilots" who are in an inactive status, there will be a number of interesting features. Descriptions of new planes and engines, a thrilling war story, new dope on directional radio, and so on, with other stories too numerous to mention here.

—and then there are the departments

where you will find all of the new and old feature columns that have always been so interesting. For example, there is the new Barter and Exchange Department which hundreds are finding mighty useful, then there are the Dream Ships, the Question and Answer Department, the Lightplane Association, etc. And modelists, note this! There will be complete drawings for the Vought Corsair SU-1, which is a later ship but very similar to the Grand Prize Winner in our contest.

MAKE SURE THAT YOU GET THE MAY ISSUE AND THE FOLLOWING 11 ISSUES BY SUBSCRIBING FOR P. A. THIS IS THE ONLY CERTAIN WAY TO INSURE ALL ISSUES. DO IT TODAY—THE COUPON IS FOR YOUR CONVENIENCE.

POPULAR AVIATION
608 S. Dearborn St.
Chicago, Ill.

Please enter my subscription to POPULAR AVIATION for one year. Send me a bill later for $2.50.

Name .....

Address .....

City ..... **State** .....

Just fill out this coupon and mail it to us now. We will bill you later. $2.50 for a year's subscription. It is not necessary to pay now.

Looping

(*Continued from page* 261)

above or somewhere near the horizon. In either case keep the stick way back and continue to kick the wings down whenever they try to come up.

IF THE ship dives, it will come out nicely of its own accord and you can shove the stick forward to neutral as soon as flying speed is regained. All you need is a certain amount of altitude. The place to find out how much altitude you need to recover from certain kinds and degrees of stalls is way upstairs on your imaginary flying field in cloudland where mistakes don't count.

Close to the ground, there is just one thing to do in case of a stall—hold the stick back, and keep the wings level by kicking rudder. If you have a motor—use it. So far, we have considered only so-called normal stalls and spins but now we can consider variations which are important but not so easy on the spinal column. One form of stall is accomplished by pulling back on the stick with plenty of flying speed rather sharply, without giving the plane time to gradually lose flying speed.

The result is that the plane rears its nose up sharply to the vertical and when the nose finally drops it does so with a bang. This is called a "whip-stall," not such a pleasant experience but quite safe with a good sound ship and worth trying once or twice though it is not a jam into which you are apt to get yourself by accident in ordinary flying.

The power stall, in which the ship is gunned wide-open and pulled up, is a good deal like the power-off stall except that the ship will naturally poke its nose up to a much higher angle before she drops and it will be harder to keep the wings level though diligent rudderring will turn the trick.

In recovering from stalls and spins, the stick is always to be pulled back gradually and the faster the ship is travelling, the more important this becomes for two reasons. First, it is perfectly possible to get so much pressure on the wings by a too sudden recovery that they will be neatly stripped off the fuselage. Secondly, if the wings do stay on, the net result may be that the plane will not have time to properly bite into the air and change its flight path and you may squash through the air for a few hundred feet—or right on down to the ground if you are low enough.

In addition to the normal spin already discussed, several variations will be briefly described and should be tried as the student advances in aerobatic practice. The power spin is somewhat harder to start on account of the propeller holding the nose up and the ship revolves much faster once she gets started. The control positions are the same as for the normal power-off spin. It is important in the power spin to

idle the engine before you try to recover.

I will mention three other ways to put a ship into a spin which will be fully developed later on. A real snappy spin may be started by kicking full rudder as you pull the ship up into a stall instead of waiting until the nose is ready to drop. The suddenness of going in will make you think that you are revolving at a great rate but as a matter of fact the machine spins at about the same speed as in the normal spin. This kind of spin seems to create a greater dizziness on the part of the pilot and it is more difficult to judge the recovery.

There is a tendency for the pilot to misjudge his "come-out" and to feel that he is still spinning when, as a matter of fact, the ship has recovered in answer to correctly applied control. The dizziness leaves the pilot after a few moments of straight flight and perception returns. Needless to say, this kind of spin and other abnormal maneuvers should be handled carefully but their successful execution is part of a pilot's training and if he cannot perform them he is dangerous to himself and to passengers riding with him.

Still another way to start a spin is from the top of a loop by pulling the stick clear back, applying full rudder and closing the throttle. A third way to start a spin, and one which may be the result of an accidental or thoughtless use of the controls, is found while flying in a steeply banked turn. Again we pull the stick back and apply top rudder—the result will be all that could be desired.

THE reader will be curious about the famous "flat spin," but fortunately this has been engineered out of present day commercial planes and is only of interest to test pilots or pilots intending to fly abnormally loaded or modified ships.

The student flying today in an approved ship may gather some satisfaction from the fact that the spinning characteristics of his ship have been very carefully studied by the Department of Commerce and test flights have proved that it will come out of a spin after five turns in a turn-and-one-half with the pilot's hands and feet off the controls.

New experimental ships sometimes perform the flat spin wherein the nose of the ship is almost on the horizon. If we mount a model airplane on a vertical axis passing through the center of the ship, with the wings and fuselage in a horizontal plane and then rotate the ship about this axis, we have a fairly clear picture of what takes place in a flat spin.

Obviously, one wing is going backward while the other is going forward which means that the aileron going backward will be given back pressure and the stick will be forced sideways against the knees of the pilot. The control stick will be forced back at the same time and the rudder will forcibly hold itself toward the center of spin.

The only way to get a ship out of a flat spin is to reverse the position of the controls and the pilot may require 150 pounds of force or more to do this. The flat spin seems to be affected by change of the center of gravity of the ship and planes have been known to come out of the spin when the pilot scrambled out of the cockpit and prepared to jump.

Planes in a flat spin have also been corrected by the pilot climbing from the rear to the front cockpit and on the other hand, one ship of notoriously bad flat spinning characteristic was cured of its bad habits by moving the center of gravity back.

As stated before, some present day ships will flat spin if improperly loaded and are pretty sure to flat spin if the motor falls off the nose. "In such a case," says Clabaugh, "I suggest that you just step out of the ship and hope that the little old silk worms did a good job when they spun the silk in your chute."

END.

"LITTLE PROPS"
50c Each

I just found 200 little World War Airplane Generator Propellers. They cost $12 to make. I bought them cheap. Now you can buy these Real Walnut stained Propellers 15" long for 50c. All new and shiny. Mount a clock in the hub! Make an ash tray out of one! A nice paper weight or ornament for your desk or wall! Send me 50c plus 10c postage today and mail it right away as I have only 200 of them and I know that they won't last very long. Send one thin dime for new 1933 Aviation Catalogue. Low prices!

KARL ORT
600 W. Popular St. York, Pa.

Build This
NEW BOAT
in 3 days at home with our
COMPLETE KIT $11.75
(all parts cut-to-fit)

The 18-lb. nonsinkable MEAD KI-YAK is the most sensational boat development in years! You can lift it with two fingers; you can carry it on your bicycle; it rides big breakers like a Hawaiian surf-board; it will carry you in 3 inches of water.

FAST LIGHT SEAWORTHY
THE SNAPPIEST THING AFLOAT!

FREE! An 8 ft. double-bladed spruce paddle with the first Kit shipped to each town. Worth $6.00. WE HAVE A REAL MONEY-MAKING PROPOSITION for wide-awake boys. Send dime TODAY for complete information and descriptive circulars.

MEAD GLIDERS
Dept. E-43, 12 S. Market St., Chicago, Ill.

Do Not Waste Your Spare Time—Study Aviation

These Famous Books Will Prepare You to Qualify as an Expert on Planes and Engines. Written so You Can Understand Them.

ALL YOU NEED TO KNOW ABOUT AVIATION
AIRPLANE AND ENGINE BOOKS
By Lieut. Col. V. W. Page, Air Corps, U. S. R.

AVIATION ENGINE EXAMINER
EVERTHING you want to know about Aviation Engines simply explained in question and answer form! A comprehensive set of lessons in book form—at little cost. Prepared by Lieut. Col. Page, one of aviation's leading authorities. Just the book you need to qualify as aircraft engine mechanic. Indispensable to pilots, students, etc. Easy to understand, concise, practical. 440 pages, 250 illustrations. Price—$3.00.

EVERYBODY'S AVIATION GUIDE
A PRACTICAL, non-technical book for the aviation enthusiast that teaches aviation from the beginning and gives complete information necessary for U. S. Government license. Among the contents are a brief history of aeronautics, description of various forms of aircraft, elementary aero-dynamics, airplane parts and their function, airplane fuselage forms and landing gears, airplane wing forms and construction, engine types, propellers, airplane equilibrium and control, official records. 256 pages, fully illustrated. Price—$2.00.

MODERN AIRCRAFT
"ONE THOUSAND DOLLARS worth of aeronautical information for the small sum of five dollars," says Thomas L. Hill, Pres. Am. Society for Promotion of Aviation, Inc., of this comprehensive treatise that covers all phases of aeronautics. Written by an internationally known automotive engineering authority, it answers every question about the design, construction, operation and maintenance of all types of American and foreign airships, airplanes and engines. Used as a refrence and text book in more than two hundred aviation schools. 855 pages of solid information with 400 illustrations and 23 tables. Price—$5.00.

A B C OF AVIATION
THE answer to the great need for a simple, inexpensive book that will give beginners a basic knowledge of aircraft and why they fly. A readable, popular discussion of aviation, its history, its possibilities, the principles on which various types of flying machines operate, both lighter than air and heavier than air. Profusely illustrated, showing leading types of airplanes with explanatory diagrams. 160 pages, 150 engravings. Paper bound. Price—$1.00.

MODERN AVIATION ENGINES
THE most complete treatise on all types of aircraft motors ever published. A gold mine of necessary information for flying schools, pilots, field mechanics, shop men, engineers, students, beginners. Each volume contains 1,000 pages and 500 illustrations. Volume One covers the principles of engines, elementary thermo-dynamics, engine parts and functions etc. Volume Two takes up the various types of engines in use with detailed descriptions of the leading makes, such as the Wright "Whirlwind" and "Cyclone," etc.—Price, per volume—$3.00; Both volumes—$9.00.

A B C OF GLIDING AND SAILFLYING
THIS comprehensive book tells you everything about the thrilling sport of motorless flying. Based on practical German and American experience. Explains all leading types of Gliders and Sailplanes, their construction, control, launching. Fully illustrated. Also includes WORKING DRAWINGS FOR BUILDING A STRONG YET SIMPLE PRIMARY GLIDER. 294 pages, 72 illustrations. Durable Antique Paper Binding, $1.50. (Cloth Binding, $2.00.)

CHECK TITLES YOU WISH TO EXAMINE
Mail the Coupon—You Need Send No Money

NORMAN A. HENLEY PUBLISHING CO., Dept. PA 433
2 West 45th Street, New York, N. Y.

Gentlemen: Please send the books checked below for my examination. I enclose no money but will deposit the price, plus a few cents postage charge, with postman on delivery. You agree to refund my money in full if I return books within 5 days.

☐ Modern Aircraft, $5.00
☐ A B C of Aviation, $1.00
☐ Modern Aviation Engines, 2 vols., $9.00
(Check here for single volume at $5.00 ( ) Vol. One: ( ) Vol. Two.)
☐ Everybody's Aviation Guide, $2.00
☐ Aviation Engine Examiner, $3.00
☐ A B C of Gliding and Sailflying —Paper Bound $1.50; Cloth Bound $2.00

Name .....
Address .....
City ..... State .....

NOTE: If you enclose remittance with this coupon, we will pay postage charges. Same 5-day return privilege. (Remittance must accompany orders from Canada or foreign countries.)

Advertise in this Directory. Rates: $2.00 per insertion.

BUYER'S DIRECTORY

One-Inch Advertisements. No more — no less.

AIRPLANES FOR SALE

FOR SALE
Dismantled Hedge Hopper—Nothing Damaged

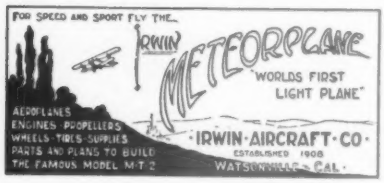
Fuselage (with motor mount fittings)	$18
Chevrolet Motor (converted)	$10
Wings	$14
Rudder	$ 4
Fin	$ 3
Stabilizer	$ 4
Elevators	$ 4
Total price	$57

Entire outfit will be shipped for $50
Write: Andy Beauseau, President
Bay City Glider Club **Bay City, Texas**

CORBEN SPORT PLANES
"CORBEN BABY ACE"
Snappy single place sport plane
"CORBEN JUNIOR ACE"
Two-place convertible sport plane
Both are now offered flyaway or in semi-built kits for the home builder.
Send dime for illustrated folder
CORBEN SPORT PLANE CO.
Madison Airport **Madison, Wis.**

REAL-PLANE-BARGAIN
Safe, stable, Lincoln PT 2 place biplane. OX5 Engine, Hartzell prop, 18 x 6.00 low pressure tires. Licensed till June, 1933. Also extra OX5 rebuilt and about 85% complete. Extra set New 26 x 4 wheels, tires and discs. Entire ship in 1st class shape. Never crashed. Orange wings, blue fuselage. Complete outfit $425.00. Photo 15c.
J. B. DAHL
3661 Archer Ave. **Chicago, Ill.**

USED AIRPLANES
$50 and up. **Easy Payments**
Free Flying Instruction. Cars taken in trade.
Sensational Bargains. Catalog 10c.
Federal Equipment Co.
Dept. 11 **DEER PARK, CINCINNATI, OHIO**



PLANE BARGAINS
1930 Heath Parasol, complete covered and doped a real bargain $100.00. Complete description and photo, 10c.
1929 Heath steel fuselage, covered and doped, $55.00. Complete description and photo, 10c.
1929 Heath welded tail surfaces, uncovered $15.00
1929 Fuselage, welded by Heath, $35.00. Time payments if desired. Our 1933 catalogue, No. 9 is most complete light plane parts catalogue in America. Lowest prices, one dime brings it to you.
KAMM AIRCRAFT COMPANY
819 Fifteenth St. **Oshkosh, Wis.**

FOR SALE
Single Seater sport plane complete less motor $100
50 H. P. Gnome engine new $50
Imported German Glider or light plane motor, weighs 35 lbs. twin Bosch magneto, lightest motor in America. Complete with propeller hub...$50
Windwagon factory job, motor all nickel plated, cost $500, Indian twin motor new, with Heath Propeller thrust bearings, car like new, sell for $150
Motor, less car for light plane complete...$100
Photos of above with description 25c
Arthur De Madaior **Hampton Bays, Long Island, N.Y.**

Curtiss Robin Lic	$ 585.00
American Eagle Lic	385.00
Waco 10 Lic	425.00
Heath	225.00
Ireland Boat	1250.00
Damaged Robin	200.00

Marvin Northrop Airplane Co.
Minneapolis, Minn.

IF you have anything to BUY
IF you have anything to SELL
USE THIS DIRECTORY

FOR SALE
Identified Heath Super Parasol with Henderson motor. Welded fuselage. Complete with instruments and skis. Total time one hour. In perfect flying condition. Will sacrifice for cash. Best offer takes it.
L. D. PIERCE
Box 123 **Plymouth, N. H.**

BUY and FLY
Ask advice on power
PENOYAR PLANES
In Model Speed Boats
Los Gatos, California

PLANES AND PARTS FOR SALE
1 C-W Junior, good as new $ 650
1 Arrow Sport, Kinner K5, condition good $ 700
1 Arrow Sport, Kinner, K5, condition very good $ 900
1 Great Lakes 2T1A, condition excellent $1000
2 C-W Jr. airwheels complete, nearly new $20 each; 1-5 .00X4 Tailwheel with tire and tube, $15; 2-32X6 Dayton casings, smooth, nearly new, $3 each; 1-V-A-G-9-D Mag. $25; 2-MN7-D Mags. $25 each; 3-sets Junior Air Service Courses, $10 ea.
SIDLES AIRWAYS CORPORATION, UNION AIRPORT, Nebraska's Largest Airport, LINCOLN, NEBRASKA

FOR SALE
Heath S. V. Model almost completed by experienced workmen, welded fuselage with B4 motor, fifteen hours. Bought new and carefully broken in. Three Hundred Fifty Dollars for quick cash.
Quarrier Studio, Inc.
1009 Quarrier St. **Charleston, W. Va.**

AIRPLANE PARTS

FOR SALE
Slightly used Waco Glider parts in first class flying condition, also other bargains in small motors and propellers. Send 10c for bargain lists.
The Heine Motor Works
ORWIGSBURG, PENNA.

SPECIAL SALE

A. N. Specification Safety Belts, 5-in.	$1.50 ea.
Pullies—1½ in. Dia. for ⅛ in. Cable	.15 ea.
Pullies—3½ in. Dia. for ⅛ Cable	.20 ea.
1/16" and 1/32" Birch Plywood	.12 Ft.
Steel Tubing 1015 ⅞-1-1⅛ Dia. x 18 Gauge	.12 Ft.
Turnbuckes—Fork and eye	.08 ea.

Spruce ¼" x ¼" strips. 500 Ft. $4.00. ¼" x ½" 500 Ft. $6.00. Balsa Wood—Send 50c for extra large bundle postpaid.
Send stamp for additional bargains.
Jeffer Aircraft Co. 351 Central Ave. Hawthorn, N. J.

MOTORS FOR SALE
1 Lawrence 2 cyl. 28 H. P., practically new, never been used, complete, less propeller $60.00
1 Harley-Twin 74. 20 H. P. motor, overhauled and converted New Hub, New Propeller, complete, CHEAP $35.00
Send 1/3 with order balance C.O.D. subject to inspection. LIGHT-PLANES, MOTORS, and SUPPLIES DIRT CHEAP. Do you want to receive my Monthly BARGAIN-BULLETIN on Lightplane bargains. If you do send 10c coin and receive the Bulletin and other literature every month during 1933.
Charles J. Lackey **1143 Cherry St. Pottstown, Penna.**

BARGAINS
Cirrus Motor 90 H.P. Like new with only 15 hours..... **$200.00**
BRAND NEW PROPELLER HUBS
complete with plate and nickel steel bolts. For Heath, Church, and converted Henderson motors, $10.00 value for only **$5.00**
Lorenzen Propellers **Niles, Mich.**

OFFER
Enclose three cent stamp for my lists of aeroplanes, parts, and accessories in addition to which you will find a plan for partial payment and delivery of planes to your door that will advance the day of your aerial opportunities.
Marvin A. Northrop Aeroplane Co.
Minneapolis, Minn.

Zenith O-20000 Foot Altimeter
postpaid U. S. and Canada
$2.75
Marvin Northrop Aeroplane Co.
Minneapolis, Minn.

DON'T BUY anything until you get Ort's 1933 Aviation Material Catalogue. Prices are lower. Send one thin dime today.
Karl Ort
670 W. Popular St. **York, Pa.**

Low prices on propellers 4½ ft. to 6½ ft. diam. for lightplanes, iceboats, sleds, windwagons and midget cars. Propeller hubs for Indians, Harleys and Fords. Indian single cyl. and twin cyl. engines for small cars, iceboats and airdrive water boats. Turnbuckles 10c. Flying Flivver Blueprints $3. Ford conversion-motor Blueprints $2. ⅛" extra flexible cable 5c ft. 3/32" flexible cable 3c ft. Midget car front axles $5. New Bargain List 10c.
Storms Aviation Co.
88 Charlotte St. **Asheville, N. C.**

AIRPLANE PROPELLERS

PROPELLERS
ALL KINDS
NEWEST TYPE
Highest Performance
Lowest Price. Free Catalogue
DUMAS AIRCRAFT CO., 1330 E. Pike, Dallas, Texas

IMPROVED PROPELLERS
For quick service, order from this ad, cash with order.

4-ft. diameter for Harley and Indian Motors	$4.50
4-ft. 6 in. for Heath Henderson metal tipped	$8.98
6-ft. for Fords, Lawrence and Anzani metal tipped	$9.98
8-ft. for the O. X. 5, laminated Oak, Copper tips	$19.95

New Heath Ship, $248.00; 40 H. P. Aeronautical Motors $75.00. New 1933 planes, fly away, $398.00
Photos: Information including leather bound flying manual 25c
HIBBS, Fort Worth, Texas

PROPELLERS
Designed and built for
Racing Planes, Sportplanes, Windwagons, Windtunnels, Hydrogliders, Ice, and Snowsleds.
New low prices on all Special Propellers. Send 3 cent stamp for circular.
LORENZEN PROPELLERS
Dept. P.A. **Niles, Mich.**

TROYER PROPELLERS

4'6" Diameter for Heath-Henderson	$ 8.50
6' D for Fords Anzani and cross country twin	12.50

Light plane wheels aluminum alloy 14 x 3
KERMIT R. TROYER
75 Mt. Vernon Grand Rapids, Mich.

Advertise in this Directory. Rates: $2.00 per insertion.

BUYER'S DIRECTORY

One-Inch Advertisements. No more — no less.

Propellers — $3.98 and Up

That give super performance. Manufactured out of select timbers, carefully laminated, scientifically designed by practical engineers. We will bore and attach your hub, carefully crate, and balance at no extra charge. Do not buy until you get our free price lists on Propellers and Ships.

Universal Aircraft Company
Ft. Worth **Texas**

AUTOS

BUILD A FRONT DRIVE!

The details of construction of a **Real Baby Front Wheel Drive Auto** as this are now in blueprint and available to you. This car powered by a 4-cyl. motor is made of old car parts as Model T, etc. all so cheaply obtained now, and **best of all a machine shop is not a necessity** for making such a fast one. Send stamp for further details.

Edw. A. Barstraeger, 3458 N. Marshfield Ave., Chicago, Ill.

BOYS! You can build the "Bug" midget racer! Anyone can build it in a few hours. Complete parts cost only $10.00. We tell you where to get them. Everything complete.

$1 brings simplified blueprints, set of photos, instructions where to get parts and to assemble it, using only pliers, drill and screw-driver. Carries two persons. Puts Model T to shame. More fun than flying. Send $1.00 bill now.

BUG AUTO'S, Dept. P-1, Kearney, Nebr.

INSTRUCTION

Handy Aviation Manual
QUESTIONS AND ANSWERS FOR
Pilots - Mechanics - Students - Plane Owners

Sample Department of Commerce examination questions and answers on Rules, Regulations, Airplanes, Engines, Navigation, Meteorology, Radiotelephone and Operator's License. Contains careful and thorough explanation of aviation terms and expressions. 121 pages. Price $2.50.

Write Aviation Manual, P. O. Box 8
DETROIT, MICHIGAN

PILOTS LICENSE EXAMINATIONS MADE E-Z

Booklet of 300 typical exam questions with correct answers, includes 1932 changes in Rules and Regulations, Aerodynamics, Engines, Ignition, Navigation and Meteorology. Covers all grades Pilots and Mechanics written exams. Send one dollar today. Booklet of Safety Flying Rules. 115 Don'ts, with reasons on twenty primary flight maneuvers. Price 50c.

E-Z AVIATION SYSTEM
Box 6-P, Rosedale, N. Y.

For complete information on the

Free Flying Training

given by the Army Air Corps, send for our bulletin "FLYING WITH THE ARMY." Flying Cadets are paid a salary while learning. Get full information on how to apply for this training. Price 20c postpaid.

FEDERAL EQUIPMENT CO.
Dept. 11 **DEER PARK, OHIO**

$1.00 Parachutes $1.00

A complete course in jumping, packing, inspection and how prepare for U. S. Department of Commerce license. Written by the holder of the world's altitude record, a man who has jumped over 200 times from 300 feet to 27,200 feet.

Bert White
1224 Airway **Glendale, Calif.**

MODEL AIRPLANES (Ready Built)

Solid Scale Models

Finished Models of Modern Fighting Planes. Complete with Wire Riggings and Insignias. (U. S.) Berliner Joyce P-16. Curtiss A. 8 and Curtiss Hawk P-6E. (British) Vickers Jockey. (French) Dewoitine D-27-C1. Wingspread 7" to 9". $1.10 each. 2 for $2.00. With MOVABLE CONTROLS $1.25 each. 2 for $2.25.

CHRISTIE BATLAS
P. O. Box 149 **Morgantown, W. Va.**

CLASSIFICATIONS

Airplanes for Sale....264
Airplane Parts....264
Airplane, Propellers....264
Autos....265
Instruction....265
Models (Ready-Built)....265
Model Kits & Plans....265
Model Supplies....267
Photographs....268
Miscellaneous....268
Classified....268

FINEST SCALE MODELS

Beautiful balsa models of famous planes. Three to five inch wing spread. Completely finished. Any type you desire. These planes are complete in every detail, such as motor parts, pants, cowling, rigging wires and insignia.

65c each. 3 for $1.75 P. P.
10" Completely finished Howard "Ike" $2.10 P. P.

Genesee Aircraft
141 Westfield St. **Rochester, N. Y.**

Ready Made Models

12" Span Only $1.25 P. P.
Boeing P12B—Puss Moth
Camel—Polish Fighter
NOT a profile—guaranteed to fly

Highway Model Aircraft
1665 W. 5th St., Brooklyn, N. Y.

FINISHED SCALE MODELS

Order any scale model you wish and enclose $1.00 plus postage. Wingspread 4 in. to 6½ in. Pine wood construction, glossy lacquered finish. Enclose 25c east of Mississippi, 40c west of Mississippi, 40c Canadian and foreign charge. No C. O. D. orders. Larger scale models also made to order. All inquiries answered on special model aviation projects.

MUELLER BROS., 28 Peach St., Buffalo, N. Y.

BUILDING SERVICE

Models built to order. Send stamp for price of model you want and price list of ready-to-fly CLEVELAND DESIGNED models.

Expert Drafting Done

FRANK T. ROBERTS
P. O. Box 294 **Jamesburg, N. J.**

FREE! A 14 in. Soaring Glider with each model! These are not kits but completely finished models, ready made and guaranteed to fly. All models are of **Built-up** construction and all attractively colored.
16 in. Cabin Commercial, 1000 ft. flights.....$1.25
22 in. Cabin Commercial, 1500 ft. flights.....$2.00
30 in. Cabin Commercial, ½ mile flights.....$4.50
30 in. Professor Type Soaring Glider, 1½ Min. Duration . $1.95
48 in. Professor Type Soaring Glider, 2½ min Duration . . $4.95
25c packing, crating and insurance charge on all models.

SEA GULL MODEL AERO CO.
155 Beach 113 St., Rockaway Pk., L. I., N. Y.

FREE! A 14" Soaring Glider with each model. The following ready built models are constructed as described in our other ad and are guaranteed to fly. A 3c stamp brings our estimate on any ready made model desired. 25c packing, crating and insurance charge on all models.
20" R. O. G. Tractor—1000 ft. flights.....$ .75
19" "Bullet" Twin Pusher—Duration 3 min...$1.95
19" "Cloudbreaker" single pusher—Duration 2½ min.....$1.25
36" contest twin pusher—duration 10 min...$3.95

SEA GULL MODEL AERO CO.
155 Beach 113 St. **ROCKAWAY PK. L. I., N. Y.**

Beautiful 20" Fine Detailed, True Scale, Ornamental Models, of the Gee Bee Super Sportster, Curtiss Hawk P-6-E and Falcon AC3. (Hawk model illustrated) **Unusually Complete Construction Kits,** nothing extra to buy, including 3-view drawing, pattern layout and full instructions. Gee Bee S. S. $3.75; Hawk P-6-E $3.50; Falcon AC3 $3.25; Postage 30c. **Satisfaction Guaranteed or Money Refunded.** Rush 5c for new illustrated folder and prices of finished models. **Victor Stanzel, Schulenburg, Texas.**

BOY! OH BOY!

Finish scale model of the Laird Super Solution with wheel pants, miniature controls, and other details for only $.50. 5½ in. Wing Span. Also the Hawk P6-E, Hell Diver, Gee Bee, Vought Corsair, Fokker Triplane, British S. E. 5, Sopwith Camel, Pfolz, Boeing Fighter, Albatross, Supermarine. All details are decorated in colors. 6 in. Wing Span, any one $.80 p. p. This sale expires May 10.

GEORGE VENTURA
96 Arthur Ave. **Providence, R. I.**

MODEL KITS AND PLANS

A Great German Fighter
The Halberstadt C. L. 2
A 22¼" FLYING SCALE MODEL

This month we are featuring this well detailed model in the most complete kit on the market. Parts stamped and semi-formed. A model in which flyability is designed.....**$2.00 P. P.**

Black Hawk
2851 Vincennes St. **Pittsburgh, Pa.**

Boeing P-12-E (See Cover)

5⅜" wing span **solid scale KIT.** A beautiful complete kit of this snappy army corps plane. Balsa printed, stamped aluminum prop, khaki and yellow lacquer, wing and rudder insignia, cement, turned hardwood wheels, windshield, dwg., etc. Unbeatable value. Postpaid, M. O..... **35c**

W. Burr Bennett
Honesdale, Pa.

MODEL AIRPLANES AND SUPPLIES
for both Gasoline and Rubber Driven Types

Carlson Albatross 75" Gasoline Powered Cabin Model Airplane, using Knight Motor.
C. O. Attack—17" Gull Wing, Rubber Driven Model—Construction Set $0.75 P. O. B.
Send 10c for Circulars, Including Scale Drawing for 12" Model of Laird Super Solution.
See Power Model Boat & Airplane Co. ad for motors to suit these airplanes.

CARLSON MODEL AIRPLANE CO.
134 S. Clinton St. **Chicago, Ill.**

ALL BALSA R. O. G.
14" WING SPAN

SURE FLYER!!

A complete kit with all parts cut to shape. Positive flyer, easy to construct. **25c** Add 5c for postage

Construct-A-Plane Company
285 Bushwick Ave. **Brooklyn, N. Y.**

BOEING P-12C
20" FLYING SCALE MODEL

The most complete kit ever offered to the model builder at such an astounding low price. Comes to you complete with machine turned balsa cowl and printed motor balsa ribs and formers. Full-sized plans and a liberal supply of everything necessary to build this beautiful flying scale model. **$1.10** Add 10c For Postage

CONSTRUCT-A-PLANE CO.
285 Bushwick Avenue **Brooklyn, N. Y.**

BELLANCA SKYROCKET
20" FLYING SCALE MODEL

For real value this kit can't be beat. It has all that can be offered in a kit at any price. Printed balsa parts, turned balsa finished nose piece, turned balsa balloon shaped wheels. Plenty of dope and cement and more than enough material to build this popular high performing model. **85c** Add 10c For Postage

Construct-A-Plane Co.
285 Bushwick Avenue **Brooklyn, N. Y.**

FREE WITH EACH EAGLE KIT
A DANDY 12" GLIDER
E-2 FAST MAIL

Flies past them all. A real bargain for $1.00 17½" of speed, its a blue and white beauty. Complete kit and full size plans .....$1.00 p.p.
14" **Howard Racer** popular speed Demon $ .75 p.p.
EAGLE KIT Model Airplane and Supply Co., Dept. P4
2908 W. 22nd St., Chicago, Ill.

(Continued on next page)

Advertise in this Directory. Rates: $2.00 per insertion.

BUYER'S DIRECTORY

One-Inch Advertisements. No more — no less.

MODEL KITS AND PLANS

SKY HAWK

12½" Red and White Cabin monoplane. Takes off the ground, climbs like a hawk and easy to build. Complete kit and full size plans..$ .50 p.p.
17¼" **Curtiss Robin** record smasher.....**$1.00 p.p.**
Remember all Eagle Kits are easy to build and contain full size plans with detailed instructions.
EAGLE KIT Model Airplane and Supply Co., Dept. P4
Send 3c stamp for catalog. 2906 W. 22nd St. Chicago, Ill.

2 Ft. Bowlus Glider

A 24" tapered wing model of the famous Bowlus soarer. All Balsa construction with demountable wings. Can be adjusted for 30 ft. diam. loops, turns, and soaring flights. Has a gliding angle of 15 to 1. Can be assembled in ½ hr. after receiving. The kit is semi-consructed.
Plans and kit for 24" plane, postpaid in U.S.A. .50c
GOLDEN ARROW MODEL AIRPLANES
53 Vinewood Avenue Pontiac, Mich.

KITS

15" FLYING SCALE MODEL KITS of Boeing P12B, Stinson, S.E.5, Bellanca Skyrocket. Complete with full size plans, all ribs and essential parts printed on balsa, celluloid wheels, 2 colored sheets of paper, all wire parts formed, carved prop, all wood cut to size, and large bottles of clear dope and cement, 2 for $1.20.

65¢ POST PAID

HEATHE MODEL AIRPLANES
Dept. A1 438 E. 98th St. Brooklyn, N.Y.

PLANS

authentic 3/4" flying scale. BEECHCRAFT 17R. new biplane with negative stagger. Top speed 201 m. p. h. 26" wing span. NORTHROP GAMMA. Frank Hawks new low wing wonder. Top speed 220 m. p. h. 36" wingspan. All parts clearly shown full size. Sheet app. 24"x32".
PRICE 50c each.
No stamps or foreign coin.
Huntington Model Aircraft Co.
P. O. Box 5044 Huntington, W. Va.

FREE DON'T MISS THIS
15 in. model plan and one insignia sheet with every $1.50 order.
Polished Balsa 36 in. lengths
1/32" x 2" 4 for..... .15 1/32" x 3"..... .07
1/16" x 2" 4 for..... .15 1/8" x 3"..... .10
20 in. Flying Scale Model of Bellanca Skyrocket, $0.85 and Boeing P-12C $1.00. Kits contain printed bulkheads and ribs, finished nose piece, full size plans, instructions, etc. Write for price list. 10% postage.
Haverhill Model Airplane Supply Co.
285 North Broadway, Haverhill, Mass.

22 "U. S. NAVY" CORSAIR

Flying scale model. All parts clearly stamped on balsa. Complete with full size plan and instructions.

25¢ POST PAID

HUB Remit Ck or M.O. Send 3c stamp for price list
MODEL AIRPLANE & SUPPLY CO.
475 Brook Av., Bronx, N. Y. (Dept. P)

24" U. S. ARMY HAWK

Flying scale model. All parts clearly stamped on balsa complete with full size plans and instructions.

25¢ POST PAID

HUB Remit by Ck. or M. O. Send 3c stamp for price list
MODEL AIRPLANE & SUPPLY CO.
475 Brook Av., Bronx, N. Y. (Dept. P)

24" New Fokker Hospital Ship

Flying scale models. All parts clearly stamped on balsa complete with full size plan and instructions.

25¢ POST PAID

Remit by Ck. or M. O. Send 3c stp. for list
HUB MODEL AIRPLANE & SUPPLY CO.
475 Brook Av., Bronx, N. Y. (Dept. P)

IF you have anything to BUY
IF you have anything to SELL
USE THIS DIRECTORY

24 Inch U. S. MARINE FALCON

Complete with full size plans and instructions

Flying scale model. All parts clearly stamped on balsa.

25¢ POST PAID

HUB Remit by Ck or M. O. Send 3c stamp for price list
MODEL AIRPLANE & SUPPLY CO.
475 Brook Av., Bronx, N. Y. (Dept. P)

FULL SIZE PLANS

with instructions of 3 to 8 ft.
UNUSUAL type Flying Models.
Designed by Prof. T. N. de Bobrovsky
Send 3c stamps for complete list
A. L. JONES
51 Greenleaf Ave., W. N. Brighton, N. Y.

MONO-TRANSPORT
A beautiful colored 18" streamlined, tapered, low wing model. The fuselage (the hardest to make) is made of balsa veneer all ready shaped. This kit also contains ready cut ribs, select balsa, bamboo, wire, washers, cement, colored dope, special process rubber, ready made cell, motor ring and wheels, colored tissue and full size detailed plan. Excellent flyer. Easily constructed. Complete kit $1.50 p. p. Send 3c stamp for our latest price list.
ART KRONFELT'S MODEL SUPPLY
218 Mountain Ave. Arlington, Mass.

FREE

Send stamps for our latest price list and receive a Boeing plan Free.

LANGLEY MODEL AIRPLANES Dept-A5
438 E. 98th St. Brooklyn, N.Y.

CAPT. HAWKS' NORTHROP "GAMMA"

24" Model Kit, $2.00 p.p.
Guaranteed actual photo of model. Authentic scale model in every detail.
LINDBERGH MODEL AIRCRAFT CO.
3737 N. Sawyer Ave. Chicago, Ill.

FRANK HAWKS'
NORTHROP "GAMMA" the TEXACO SKY CHIEF
10½" model

2. CURTISS CONDOR Bomber 12" model
3. { Combination Kit Boeing Bomber 10" XP-936 Pursuit 3⅝" Both to same scale

Any kit, including full-size, detailed drawing, colored dopes, etc., for **35c** POSTPAID
realistic solid models
MAJESTIC MODEL AIRCRAFT CO.
Dept. A, 100 Fifth Ave., New York, N. Y.

"DURAND designed models FLY"

Fly a "SPEED DEMON!"

Sturdy, 21½ in. outdoor model with SPEED, CLIMB, and DISTANCE that will surprise you! COMPLETE KIT with detailed plan, finished propeller, ribs, and fittings, balsa, paper, dope, cement, rubber, etc. ONLY **$1.00 p. p.**
Midwest Model Airplanes & Supplies
SE. Corner 50 & Miami Sts. Omaha, Nebr.

Scale Drawings

ALL OF FLYING MODEL AIRPLANES
Curtiss Navy Racer 1930, 28", 50c; Curtiss Hawk P6E 17", 25c; Boeing XP936 17", 25c; Boeing XP936 28", 75c; Boeing P12 24", 50c; Howard Racer Ike 20", 35c; Curtiss Hellidiver 24", 75c. 10c for illustrated catalogue of model air and gas motors, supplies. 1' to 5' Flying Scale Models.
Miniature Aircraft Corp.
83 Low Terrace New Brighton, N. Y.

HOWARD RACER "IKE"

Scale ¾" to the foot.
Span 15½". Weight ⅞ oz.
Plans 15c pp. Kit $1.00
Model Engineering Service
3102 W. 111 St. Cleveland, Ohio

NAREY'S (Blue Prints) 23 inch FLYING SCALE MODEL

Little Rocket	$ .35
Large Tube Cement	.10
Yangtse Bamboo, doz	.10

Best for Models
Include 15c Postage
Narey's Model Supply Co.
213 E. 20th No. Little Rock, Ark.

BOEING P-12-E

exact in every detail
The Peerless Line of ¼" Solid Wood Models Also the Akron Fighter, Curtiss P-6-E, Doolittle's Gee Bee, Sopwith Camel, Fokker Triplane. Each an exact reproduction, every detail worked into a complete drawing. Single Kits 25c or the whole SIX for $1.25 Postpaid.
The Peerless Model Airplane Co.
15205 Madison Ave. Lakewood, Ohio

Paris Air Show Sensation

The French pursuit ship Dewoitine "500" 19¼" span model in kit form. All ribs and formers stamped. Features: low wing, "V" type motor, pants have internal shock absorbers. Kit complete with blueprint, dope, cement, and colored paper for $1.20. No checks or stamps. Everything postpaid.
R. N. Rioux
Box 354 Highland Park, Ill.

Scientific's Famous 15" FLYING SCALE MODELS

Lockheed Vega, Fokker Triplane, S.P.A.D. Chasseur (illustrated), S.E. 5 British Pursuit. Easy to build. Guaranteed to fly. All 4 Kits sent postpaid for $2.00.

55¢ EACH plus 5c postage for each kit.

SCIENTIFIC MODEL AIRPLANE CO., 277 Halsey St. Dept.P., Newark, N.J.

Announcing New 12" Fine Detailed Ornamental Models
GEE BEE SUPER SPORTSTER, CURTISS HAWK P-6-E Exact duplicates of the 20" models. Each an art-piece of rare beauty and distinction. PRICES AMAZINGLY LOW. CONSTRUCTION KITS, containing an unusually large and most complete list of material, together with a 3-view drawing, pattern lay-out and full instructions. Gee Bee S. S. $1.80; Hawk P-6-E $1.70; plus 20c postage. Rush 5c for new illustrated folder and prices of 12" and 20" Finished models, Kits and Drawings.
VICTOR STANZEL, Schulenburg, Texas

STAR ★ FLYERS

25¢ EACH PLUS 5 Postg. per kit

15" Bellanca Skyrocket 15" Puss Moth
Every Kit Complete
STAR MODEL AERO SHOP, 10 Pearl St. Newark, N.J.

STAR ★ FLYERS

25¢ EACH Plus 5c Postg. per kit

15" Monocoupe 15" Waco—Model C
Guaranteed to Fly
STAR MODEL AERO SHOP, 10 Pearl St. Newark, N.J.

In writing to advertisers, please mention POPULAR AVIATION.

Advertise in this Directory. Rates: $2.00 per insertion.

BUYER'S DIRECTORY

One-Inch Advertisements. No more — no less.

MODEL KITS AND PLANS

STAR ★ FLYERS

25¢ EACH Plus 5c Postg. per kit

15" Aeronca C-2 15" Fokker DVII

True Scale Models

STAR MODEL AERO SHOP, 10 Pearl St. Newark, N.J.

BOYS! THE PHANTOM!

A white streak climbing through the air a beautiful low wing ship gliding to a landing. The Swallow "Phantom." Boys—this plane has flown over 850 feet and is the niftiest looking plane you ever have seen. Just think! So simple to build that in about three hours after the postman brings you your "Phantom" you will be flying it. Wing span 14¾ in. Order now—sent postpaid only 50c.

SWALLOW MODEL AIRCRAFT
3840 N. Newland Ave., Chicago, Ill.

BOYS—BUILD 2 WARTIME PLANES

for the price of one. Our Supply Kit contains more than enough Balsa sheets, sticks, cement, plans, etc., to build 2—15" Wartime or Modern planes sent insured and postpaid for only $1.00. HERE'S VALUE—Red Wing model airplane plans of the Curtiss Robin, Hawk, Vought Corsair, Page Racer, Lockheed Vega, etc. Regular 30c seller only 10c each. 3 for 25c. SPECIAL—17" R. O. G. plans printed on JAP Tissue. Each 3c.

SWALLOW MODEL AIRCRAFT
3840 N. Newland Ave., Chicago, Ill.

DIFFERENT FUSELAGE MODELS * THE FLEETSTER

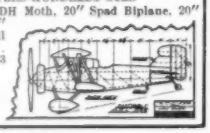
A model for beginners. Low wing open cockpit 19" span, 12" body. All but 8 parts cut to accurate shape. Finished in snappy colors RED-YELLOW—BLACK. The easiest to build model we know of. Every part cut as carefully as we would want it for ourselves. The propeller is bass wood, hand carved—true pitch, a beauty in looks and efficiency. Special till April 30th—2 extra rubber motors free with any kit. Post paid in U. S. $1.00 complete. No stamps. Sister ships are the Skylark, a high wing, $1.00 p.p. The Hornet D-2 Pursuit Biplane, $1.25 p.p.

THAYDOM MODEL AIRCRAFT CO. ATLANTIC, PENNA.

NEW PLANS—BARGAIN PRICES

FULL SIZE-EVERY PIECE DETAILED- ACCURATE
WONDERFUL FLYERS-HUNDREDS SOLD

24" Lockheed Orion, 24" DH Moth, 20" Spad Biplane, 20" Wedell Williams Racer, 30" Army Hawk, 30" Curtiss Hell Diver, 18" Nieuport "28", 20" Fokker DVII. 25c ea. 3 for 60c. RUSH ! ! !



Viking Aircraft Co.
Dept. 24
Hamilton, Ohio

MODEL AIRPLANE PLANS

Complete Detailed Full Sized Blueprints	
20⅜" Captain Hawks Northrop Gamma	$ .30
18½" Curtiss JN4D Trainer	.20
15½" Boeing P-26	.20
12" British Hawker Fury	.15
15" 1932 Gee Bee Racer	.25
12¾" Mid-Wing Racer	.15

Dealers Send Stamp for Discount List

W. T. VOGEL
2811 Woolworth Ave. (Dept. P) Omaha, Nebraska

FREE

Plans for a flying model of the HEATH BABY BULLET (if you send for our Free price list. Send postcard with name and address. Kits for above model, 15c postpaid. Flies 100ft. easily. 50 ft., 3/64 rubber, 9c; ¾" wheels, 2c each.

WOBURN MODEL AIRPLANE SHOP
(Dept. P-4), 17 Belmont St., Woburn, Mass.

The New Sensation In Flying

Be the first in your locality to build and fly the "Kiddie Kopter." Complete kit sent postpaid on receipt of 50c. Send check or money order.

THE YANKEE PROPELLER CO.
49 Park St. Dover, N. H.

A NEW POWER

FOR FLYING MODELS OF 3 to 8 FT. WING SPAN

Also the perfect power for Model Racing Boats. An entirely different Fly Weight Steam Generator and powerful Featherweight, Radial Steam Engine. Attach our Steam Generator to your present Air Motor for much longer duration, more power and considerable less weight. Very low prices for Construction Kits, Finished Parts or Ready to Run Plants. Send 3c stamp for descriptive circular No. B9

R. A. Brooks
4020 W. Lake St. Chicago, Ill.

A Real ⅛ h.p. Gasoline Engine

in miniature, for MODEL AIRPLANES and boats. ¾ in. Bore ¾ in. Stroke—weight 1 lb.—3200 R.P.M. GET CATALOGUE, REAL BOATS, MOTORS—FITTINGS, ETC.—only 20c (coin). LOUIS P. LOUTREL, 96 McDonough St., Brooklyn, N. Y.

GASOLINE MOTORS

for Model Airplanes and Boats

1 & 2 cylinders—⅞" Bore, ¾" Stroke, 3000 R. P. M. Weight 1 cylinder motor about 7 ounces. Send 10c for full particulars including sectional view drawing of 1 cylinder motor.

See Carlson Model Airplane Co. ad for planes to suit these motors.

POWER MODEL BOAT & AIRPLANE CO.
134 So. Clinton St. Chicago, Ill.

MODEL AIRPLANE SUPPLIES

MODEL AIRPLANE SUPPLIES

Send your name and address for a sample of Balsa Wood and our prices on model airplane supplies.

Aero Shop, 3050 Hurlbut Ave. Detroit, Mich.

Balsa Propeller Blocks		Hand Carved Propellers	
1/2 x 3/4 x 5	3 for .02	Complete with shaft	
1/2 x 3/4 x 6	3 for .02	5 inch, each	.15
3/4 x 1 x 7	3 for .05	6 inch, each	.15
5/8 x 1 x 8	3 for .05	7 inch, each	.20
3/4 x 1½ x 10	2 for .07	8 inch, each	.20
1 x 1½ x 11	.04	9 inch, each	.25
1 x 1½ x 12	.05	10 inch, each	.25
1 x 1½ x 14	.07	11 inch, each	.25
Formed propeller blanks		12 inch, each	.30
2c each extra		14 inch, each	.30
No orders under 50c.		Add 15c for postage.	

Construct-a-Plane Co. 285 Bushwick Ave., Brooklyn, N. Y

Turned Balsa Wheels		Celluloid Wheels	
1/2 inch, per pair	.04	3/4 inch, per pair	.05
3/4 inch, per pair	.04	1 inch, per pair	.06
1 inch, per pair	.05	1-3/8 inch, per pair	.08
1-3/8 inch, per pair	.07	1-7/8 inch, per pair	.12
1-7/8 inch, per pair	.11	Celluloid Wheel Pants	
3 inch, per pair	.25	3/4" to 1" pair	.13
3/4 Finished Balsa Pants ½" to 1" pr.	.10	1-3/8" to 1-7/8" pr.	.23
		Celluloid Cowlings	
1-3/8" to 1-7/8" pr.	.15	2-1/4" diam.	.15
Sandpaper, pkg.	.05	3" diam.	.20
No orders under 50c.		Add 15c for postage.	

Construct-A-Plane Co. 285 Bushwick Ave., Brooklyn, N. Y.

DEALERS

We manufacture KITS AND SUPPLIES for the trade. Write for SPECIAL PRICE LIST, furnished for orders of Five Dollars and over.

Construct-A-Plane Co.
285 Bushwick Ave. Brooklyn, N. Y.

Music Wire		Motor Rubber	
Sizes: .014, .020, .028, .034, 5ft. coil, any size	.02	1/16 flat 1/16 sq. .045 sq. 1/8 flat, 3 ft.	.01
Thrust Bearings		3/16 flat, 5 ft.	.02
.025 - .035	2 for .03	Aluminum Tubing	
Brass Eyelets		1/16 o. d. per ft.	.08
1/16" o. d.	4 for .01	1/8 o. d. per ft.	.07
Washers		3/16 o. d. per ft.	.10
1/8 o. d. brass doz.	.01	1/4 o. d. per ft.	.12
1/4 o. d. copper doz	.01	Insignia Sheet	
Aluminum Leaf 5 ft.	.03	24 insignias	.10
No orders under 50c.		Add 15c for postage.	

Construct-A-Plane Co. 285 Bushwick Ave. Brooklyn, N. Y.

Construct-A-Loid Cement		Clear or Colored Dope	
1 oz.	.07	1 oz.	.06
2 ozs.	.12	2 ozs.	.10
Thinner		Dope Brushes	
2 ozs.	.08	Each	.05
Bamboo		Model Pins	
1/32x1/4x8 2 for	.01	Package of 100	.04
1/16x1/16x10½ doz.	.01	Tissue	
1/16x1/16x12 doz.	.03	White 3 for	.05
1/16x1/4x15	.01	Red, Green, Blue, Olive drab, Orange, Yellow, 2 for	.05
No orders under 50c.		Add 15c for postage.	

Construct-A-Plane Co. 285 Bushwick Ave., Brooklyn, N. Y.

Dummy Radial Engines		Ready Cut Out Insignias	
1½ inch diam.	.14	American, French and British	
2 inch diam.	.21	¾" per pair	.01
3 inch diam.	.27	1 inch, per pair	.01
Sheet Aluminum		1½ inch, per pair	.02
.005 per sq. ft.	.12	2 inch, per pair	.02
.010 per sq. ft.	.18	3 inch, per pair	.05
Reed		German Crosses	
1/32, 1/16, 1/8 5 ft.	.02	½", 1" per pair	.01
Birch Dowels		1½ inch, per pair	.02
1/8 - 3/16	.01	Add 15c for postage.	
No orders under 50c.			

Construct-A-Plane Co. 285 Bushwick Ave., Brooklyn, N. Y.

Sheet Balsa 36"		36 inch strips	
1/32" x 2"	2 for .07	1/16" x 1/16"	.2 for .01
1/16" x 2"	2 for .07	1/16" x 1/8"	.2 for .01
3/32" x 2"	.04	1/16" x 1/4"	.2 for .01
1/8" x 2"	2 for .09	3/32" x 3/32"	.2 for .01
3/16" x 2"	.06	1/8" x 1/8"	.2 for .01
1/4" x 2"	.07	1/8" x 3/16"	.3 for .02
1/32" x 3"	.06	1/8" x 1/4"	.2 for .03
1/16" x 3"	.06	3/16" x 3/16"	.2 for .03
3/32" x 3"	.08	1/4" x 1/4"	.2 for .05
1/8" x 3"	.08	1/4" x 1"	.11
No orders under 50c.		Add 15c for postage.	

Construct-A-Plane Co., 285 Bushwick Ave., Brooklyn, N. Y

FREE 2oz. CEMENT

With orders of $1.25 or over

Good Grade Model Cement, 12 oz. bottle $ .30
Insignias ½", 1", and 1½" dia., 24 for .... $ .10

GRADE "A" BALSA 18" Lengths		
1/32 x 2"	12 for	$0.15
1/16 x 2"	12 for	.17
1/8 x 2"	12 for	.25
1/4 x 2"	6 for	.25
1/8" square	100 for	.20
1/8 x 1/4"	50 for	.30

36" lengths twice the price of 18" lengths

Add 15c to all orders up to $1.50. Orders of $1.51 or over, add 10% for postage and packing.

C. S. AIRCRAFT CO. BABYLON L. I., N.Y.

A SET OF MINIATURE LANDING LIGHTS

These lights add to the appearance and attract attention to any model. The outfit comes complete with batteries, bulbs, wire and blue-print with instructions, etc. Postpaid 75c

(Stamps not accepted)

DICKSON AERONAUTICAL LAB.
P. O. Box 1384 Dickson, Pa.

FREE

GET 250 feet of finest, fresh Para rubber free. Send stamp for full particulars.

Heathe Model Airplane
Department A. H.
438 E. 98th St. Brooklyn, N. Y.

WIND TUNNEL

for testing FLYING MODELS and PARTS. Drawing and Instructions for building and operating.

Send 3c stamps for list.

A. L. JONES
51 Greenleaf Ave. W. N. Brighton, N. Y.

PRICES SLASHED!

Balsa, 18" Lengths				Prop Blocks	
1/16x1/16	33, 5c	1/8 x3/8	12, 5c	½x ¾x 6	8, 5c
1/16x1/8	28, 5c	1/4 x1/4	8, 5c	⅝x1 x 8	3, 5c
1/16x1/4	20, 5c	1/32x2	8, 10c	⅝x1¼x10	....4c
3/32x3/32	25, 5c	1/16x2	8, 10c	⅝x1¼x12	....5c
1/8 x1/8	23, 5c	1/8 x2	6, 10c	¾x1½x11	....4c
1/8 x1/4	14, 5c	1/4 x2	3, 10c	¾x1½x15	....7c
1/8 x1/4	2 x3	....24c		1 x1½x15	....7c

Add 15c for packing and postage. No orders under 40c

LENNON MODEL AERO CLUB
15 Lennon Street, Dept. P, Providence, R. I.

(Continued on next page)

Advertise in this Directory. Rates: $2.00 per insertion.

BUYER'S DIRECTORY

One-Inch Advertisements. No more — no less.

MODEL AIRPLANE SUPPLIES

PRICES SMASHED

Clear Cement, 2 oz.	.10	Rubber ⅛ flat, 36 ft.	.10
Banana Oil, 2 oz.	.08	Tissue, all colors,	
Washers, 2 doz.	.03	6 shts.	.09
Thrust Bearings, doz.	.15	Wheels, ¾" pr.	.04;
Insignia Sheet	.09	1" pr. .05; 1⅜" pr.	
Bamboo 1/16 sq. x 10½, doz.	.03	.08; 1⅞" pr.	.12
Cowlings 2¼", dia.	.17	Reed 1/32 or 1/16 7 ft.	.03
Balsa Stripper	.50	Dope, all colors, 2 oz.	.09
Wire, .018, .026, 5 ft.	.02	Clear Ambroid, 2 oz.	.15

LENNON MODEL AERO CLUB
15 Lennon Street, Dept. P, Providence, R. I.

NEW! DIFFERENT!
"ALUMINUM WHEELS"

For the particular model builder who wishes only the best. These wheels are far superior to any now offered on the market, not only in lightness but strength as well. Hundreds of dollars have been spent in dies and fixtures to manufacture these wheels, 1-½" dia. @ 20c per pr.; 1" dia. @ 10c per pr., P. P. No stamps accepted.

LINDBERGH MODEL AIRCRAFT CO.
3737 N. Sawyer Ave. Chicago, Ill.

A NEW TRANSMISSION

This new GEARLESS device doubles the endurance and increases the performance of flying models. Two separate strands of rubber run the same propeller. It may be glued to motor stick or fuselage. Directions included.

The whole transmission weighs only 1/40 ounce but will fly models up to 1½ ounces in weight. Retail price, 40c postpaid. Post card brings circular of this and other types of transmissions. Dealers write for discounts.

MODEL AIRPLANE MOTORS
2322 Stuart St., Berkeley, California

DEALERS

Colorless Cement		Clear Dope Thinner	
1 doz., 2 oz.	.96	1 doz., 2 oz.	.68
1 pint	.50	1 pint	.39
1 quart	.80	1 quart	.69
1 gallon	$2.00	1 gallon	$1.75

No C.O.D Orders—No Orders Less than $2.00 accepted. All Orders F.O.B. Brooklyn.

MERCURY MODEL AIRPLANE CO., Dept P
1592 Lincoln Pl. Brooklyn, N. Y.

BETTER SUPPLIES—Lower Prices!
18" Lengths

1/32 x 2 ..... .8 for 10c
1/16 x 2 ..... .6 for 12c
1/8 x 2 ..... .4 for 9c
Large 4" tube of colorless cement 5c
Bushings, per doz. .3c Washers, per gross .10c

No order less than 25c, add 10c postage.
Send 3c stamp for complete list

MODEL AIRPLANE UTILITY CO. (Dept. P-I)
1140-83rd St. BROOKLYN, N. Y.

Model Dealers and Clubs!

A 3c stamp will bring you our new wholesale list that will mean greater profits for you.

Larger discounts on smaller quantities!
Act at Once!

MODEL AIRPLANE UTILITY CO. (Dept.P-2D)
1140-83rd. St. BROOKLYN, N. Y.

NATIONAL'S NEW 1933 48-page catalogue "G"

the "MODEL AIRPLANE BUILDER" Containing valuable tips to model builders, complete listing of new exclusive quality supplies at lower prices, a storehouse of important data and topped off with a 12" 3-view genuine blueprint. Every model builder should have this necessary reference book. Send today. Only **10c**

NATIONAL MODEL AIRCRAFT & SUPPLY CO.
Bluebird Bldg. Dept. X-6), New Rochelle, N. Y.

PEERLESS PIGMENTED DOPES
all popular shades

The proof of their quality is the ever increasing demand. Made by men who know. Cost no more than ordinary dopes. Buy from the manufacturer who has made a study of Model Builder's problems. **Peerless Dopes do not fade. Peerless "Quik-Set" Cement—that clear, colorless, fast-drying cement that stays put.** At your dealers—if not send direct to us giving dealer's name. 1 oz. Bottle 15c p.p.

Peerless Chemical and Manufacturing Company
2014 Elmwood Ave. Lakewood, Ohio

From Now Until
APRIL 10th WE ARE OFFERING

Balsa Wood 1/16" x 2" x 36"	$ .03
Balsa Wood 1/16" sq., doz.	.05
Jap. Tissue, 20½" x 24½" any color	.02

PRICE LIST free, which contains more prices equally attractive.

Minimum order, 25c—Postage, 10c

Piedmont Model Aircraft Supply Co.
Greensboro, North Carolina

SMOKE SCREENS—BOMBS

Kit for five exploding bombs and releasing attachments (except few cents worth of chemicals) $ .45
Smoke screen attachment—complete ..... .25
High climb plane for above (150 ft. altitude) Kit 1.18
Italian "Flying Barrel" 123¾" Span Kit 1.00
Kits have stamped ribs and formers

No checks or stamps Everything postpaid

R. N. RIOUX, Box 354 Highland Park, Ill.

CONTEST SPECIALS

GRADE "A" BALSA			36" LENGTHS		
1/16x1/16	.00½	.14 for .05	1/8 x3/8	.01½	4 for .05
1/16x1/8	.00½	.13 for .05	1/4 x1/4	.02	6 for .10
1/16x1/4	.01	8 for .05	1/32x2	.03½	5 for .15
3/32x3/32	.01	11 for .05	1/16x2	.04	4 for .15
1/8 x1/8	.01	16 for .05	1/8 x2	.05	4 for .18
1/8 x1/4	.01½	4 for .05	1/4 x2	.09	2 for .17

Add 10c postage on orders under $1.50
Send 3c stamp for Price List.

SUCCESS MODEL AIRPLANE & SUPPLY
1846 W. 34 Place Chicago, Ill.

SPECIAL! SILVER CELLULOID SKIS

Just the thing for a 2 or 3 foot plane. Only 1000 pair left—order now—only 25c pair post paid. Perfect cut "Navy Specified" smooth Balsa 36 in. long, 1/16 in. sq. 7 for $0.05; 1/8 in. sq. 5 for $0.05; 1/32 x 2 in. each $0.05; 1/16 x 2 in. each $0.06; Jap. tissue $0.04 sheet; Dope—(clear) $0.08 per oz., (colored) $0.10 per oz.; Swallow Colorless Cement—Large tube $0.08. FREE—Large plan—with order of $1.00. Send stamp for price list and samples.

SWALLOW MODEL AIRCRAFT
3840 N. Newland Ave. Chicago, Ill.

BALSA WOOD
Special for Model Builders

100 Pieces, 12 Sizes, 1/16" square to ½" x 1". All 18" long, smooth cut, and good quality. Just what the model builder needs. A Real Bargain. Postpaid, 50c

Send 3c in stamps for complete catalogue, kits and supplies, also general information of interest to all model builders.

SWIFT AIR MODEL SUPPLIES
363 Brittain Road, Akron, Ohio

PHOTOGRAPHS

WARTIME PLANES

For sale: Hundreds of sharp, clear, actual photographs of pioneer, wartime, and modern airplanes. All 7½ x 9½ inches in size. Send for free list and please mention Popular Aviation.

R. R. MARTIN
1615 N. Western Ave. Hollywood, Calif.

COLLECTORS, Airplane Photographs

Beautiful clear photographs Cleveland Air Race winners, World War, Transatlantic and earliest types built. Send three cent stamp for list.

Pilot-Plane Photo Service
Gen. P. O. Box 560P
New York

PATENTS—TRADE-MARKS

Terms reasonable. Personal attention.

Send model or drawing for FREE advice.
Book "HOW TO GET YOUR PATENT" sent on request

L. F. RANDOLPH
REGISTERED PATENT LAWYER
372 Victor Bldg. WASHINGTON, D. C.

For Every Flyer
BLIND FLIGHT
IN THEORY AND PRACTICE
By Maj. Wm. C. Ocker & Lt. Carl J. Crane
America's Foremost Instructors

Only complete work thoroughly covering the subject. Permanent cloth bound book over 200 pages, 114 illustrations. Price $3.00. 5 day Money-Back guarantee. Order from Your Dealer or Write

Naylor Printing Co., 918 N. St. Mary's, San Antonio, Texas

Buy and Fly a Plane by Club Method

Complete working plans on organization of Aero Clubs, By-Laws, forms, operating costs, proven and practicable can be started by four men. Explains how ship can be bought without financial outlay and flown for only $10.00 per hour dual, $5.00 per hour solo. Also booklet on advice to beginners. Send $5.00 to

LT. B. PERRICONE
P. O. Box 317 Port Richmond S. I., N. Y.

Save
MOTOR REPAIRS
use . . .
PYROIL
(Simply add to Regular Oil)
Adjudged by engineers as "New Safety Factor" in flying. Flies plane 35 minutes with no oil! Safeguards motor. Write for Trial Test Offer.
PYROIL CO.
W. V. Kidder
President
155 LaFollette
LaCrosse, Wisc., U.S.A.

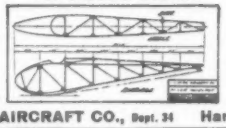
We Instruct You to Fly For $10 Per Hour
(DUAL OR SOLO)

It is possible to obtain a Private Pilot's License for as low as $200. All instruction given on licensed Air-Cooled ships at Nebraska's Largest Airport. Write for further information to

Sidles Airways Corp. Union Airport
Lincoln, Nebraska

The GLIDER PLAN-BOOK of Ten Famous Soarers

Complete; Blueprints, Specifications, Flight Performance.



BIG BARGAIN Only 45c. Order Now. HURRY!!!

VIKING AIRCRAFT CO., Dept. 34 Hamilton, O.

CLASSIFIED

MOTION PICTURE Bargains. News reels $2.25, odd reels $1.50. Bargain lists. Hoffman Film Service, 57 Broad, Albany, N. Y.

AGENTS COINING MONEY, Applying Automobile Initials. They go like Hot Cakes. No experience. Free samples. RALCO, 1084 Washington, Boston, Mass.

QUALITY PRINTING. Exceptionally low prices. Print Anything. National, Syracuse, Indiana.

BUILD YOUR OWN BOAT, using Brooks (Originators of KNOCK-DOWN System) ready-cut materials and save two-thirds regular builders costs, have more successful seaworthy craft. Frames fully assembled. Cruisrs, Runabouts, Launches, Outboard Motor, Row and Sail, including Rudders Snipe Class Sailer. Also complete assortment Propellers, Shafting and Accessories. Send 10c for catalog. BROOKS BOAT CO., Inc. Box V-39, Saginaw West Side, Mich.

PATENT Your Invention— Little Ideas May Have Big Commercial Possibilities." Send for free book, "How to Obtain a Patent and Record of Invention Blank. Prompt service. Highest references. Resonable charges. Deferred payments. Established 1898. Victor J. Evans & Co., 790 Victor Building, Washington, D. C.

Airy Chat

(*Continued from page* 210)

if we are going to be successful and the only way to arrive anywhere is to solicit members and sell memberships in this association right now—not next year.

And this will give us an opportunity of discovering whether the majority of the Howlers were in earnest or whether they were simply howling down a rain-barrel to make a big noise. We need at least 500 members to start with, and we should raise this number in jig time if the Howlers are howling in good faith.

* * *

SEVERAL of our lightplane committeemen have written that they intend to fly into Chicago during the summer and wish to take place in a big lightplane demonstration and exhibition. We'd like to hear from some more of you on this subject at the earliest possible moment for it is not so very long to the opening of the Chicago World's Fair.

* * *

MR. O. G. CORBEN, Madison, Wis., hopped into town the other day after delivering a lightplane in Indiana. He was accompanied by his engineer and reported a very successful flight in spite of the bad weather prevailing at that time.

And here's the funny part of it. Mr. Corben sent us a telegram just before he started, and hardly had the telegraph messenger departed from our office than we received a phone call stating that he had just landed at the Municipal airport. The telegram beat him only by a matter of minutes.

* * *

POPULAR AVIATION has long been recognized as fair-minded to both sides of an argument. It has followed the policy of airing all sorts of views upon a subject when that subject was in question. Again, P. A. has never promoted its own ideas in the settlement of an argument, even though it has been sorely tempted at times to do this very thing.

Therefore, we frequently publish two articles in which the authors may assume different viewpoints so that our readers may have both sides of the story. We do not introduce our own beliefs nor prejudices into the matter but give each party a break on a controversial subject. There is no attempt on our part to control the opinions of our readers by presenting one sided articles and this will continue as our policy.

* * *

SOME years ago, the State of New York passed a law making it necessary for automobile drivers to pass an examination, and from time to time we have heard loud shouts from New York officials in praise of the new system.

However, it seems that this is not all a bed of roses, and not so efficient as certain of the N. Y. official beneficiaries claim. The Chicago Police Department which has been following the results of this law very closely, has announced that there have been more traffic accidents in New York City than ever before, taken both as a total number and as a percentage.

Now this finding is more or less in line with the various air pilot's examinations, particularly in respect to the physical examinations. We know very well that accidents still occur in spite of the examinations and that this law is no insurance against trouble. The arbitrary limits set for a man's physical condition may represent average requirements of the average man but not individuals. Life insurance companies have repeatedly found this to be true.

* * *

WE have an English reader, who like ourselves, is up against anti-amateur laws. Over there they prohibit home-building, thus stopping activities at their source and do not wait until the ship is ready to fly before ruling it out of existence.

And our English friend, all luck to him, is going ahead with his construction and defies the British Brass Hats. We offer our congratulations — they may be condolences later — to our intrepid friend. Britons never will be slaves!

* * *

BY the way, there will be further publicity for the model contest entrants. Twenty-six of the models were invited to be guests of the huge Chicago Theater where they will be on exhibition from March 1-10.

Then, our Washington, D. C., and Baltimore readers will have an opportunity of seeing the five headliners of the contest—the Grand Prize winner and the winners of the four divisional prizes. This last showing will be held in Baltimore under the auspices of the Baltimore Post about the middle of March.

We had an interesting letter from our old friend T-2003 in which he tells of his meeting with Joseph Geigan, the Grand Prize Winner of the model contest, at the Smithsonian Institution, Washington, D. C. T-2003 states that he and Dr. Paul Garber, the Curator of Aeronautics, Smithsonian Institution, were the first to congratulate Geigan.

* * *

THEY are looking for by-products now. Can any of you fellows tell us how to make a little side money out of an airport or from a golf links? You can't plant anything on the ground, that's certain, but you might raise goats or sheep to the detriment of the landing qualities of the field.

BACK in the time when the Spads and Camels were frolicing about in the air, some one sang the following ode to the old D. H. which we have dug up for your inspection.

The DH4 is my airplane,
No other shall I want,
It maketh me to hedge hop in green pastures,
And it splasheth my wheels in still waters,
It spoileth my landings.
It guideth well in a loop, for its name's sake,
But in a whip stall, it is a bum.
Yea, tho my motor 'conk', I will fear no evil
While it is with me.
Its stick and its rudder, they comfort me,
It prepareth a 'washout' for me
In the absence of my attention.
It anointeth my goggles with oil,
And its radiator runneth over.
Surely the C.O. shall trail behind me
The rest of the days of my flying
And I shall be grounded forever.
A-A-Amen."

Most of you old-timers have heard it before, but it will be new to many of the younger generation.

* * *

WE HAD a surprising letter the other day that stumped the owls of the Q & A department. It reads thus: "Do planes really fly or is it only a trick?" Well, G. V. B., it's both —they fly and it is a trick.

* * *

Well, so long until next month.

J. B. R.

FOR SALE

2 Special built Model A Ford Aircraft Motors, complete with high speed propeller, center section radiator, high compression pistons, Force feed oiling system, Dual Bosch Magneto Ignition, Down Draft Stromberg Carburetor. These motors are brand new with 5 hours test run, guaranteed 65 H.P. Turns propeller 2200. Weight complete 185 lbs. If you really want something practical for your light ship see these motors on the test stand and be convinced. Motors complete $185.00 each.

FINKLEA BROTHERS AUTO MACHINE CO.
LELAND, MISSISSIPPI

NOTICE

The advertisers of POPULAR AVIATION aim to provide readers with prompt, courteous and efficient service in the handling of all orders.

Occasionally, an original order will go astray, due to an incorrect address or illegible writing.

If your order has been delayed, write to the advertiser again, or if you prefer, write to the advertising manager of POPULAR AVIATION for prompt action.

PATENT YOUR IDEAS REGISTER YOUR TRADE-MARK BY

Z. H. POLACHEK
1234 BROADWAY
31st NEW YORK

REG. PATENT ATTORNEY PROF. ENGINEER

CALL or SEND your SKETCH or SIMPLE MODEL for CONFIDENTIAL ADVICE
No Charge for Consultation

— — — — COUPON — — — —

Dear Sir:—Please send me full information and literature about Patent Protection, without obligation.

Name.....

Address.....

DO IT NO